YEARBOOK

OF THE

UNITED STATES DEPARTMENT OF AGRICULTURE

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[AN ACT Providing for the public printing and binding and the distribution of public documents.]

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Section 73, paragraph 2:

The Annual Report of the Secretary of Agriculture shall hereafter be submitted and printed in two parts, as follows: Part One, which shall contain purely business and executive matter which it is necessary for the Secretary to submit to the President and Congress; Part Two, which shall contain such reports from the different Bureaus and Divisions, and such papers prepared by their special agents, accompanied by suitable illustrations, as shall, in the opinion of the Secretary, be specially suited to interest and instruct the farmers of the country, and to include a general report of the operations of the Department for their information. There shall be printed of Part One, one thousand copies for the Senate, two thousand copies for the House, and three thousand copies for the Department of Agriculture; and of Part Two, one hundred and ten thousand copies for the use of the Senate, three hundred and sixty thousand copies for the use of the House of Representatives, and thirty thousand copies for the use of the Department of Agriculture, the illustrations for the same to be executed under the supervision of the Public Printer, in accordance with directions of the Joint Committee on Printing, said illustrations to be subject to the approval of the Secretary of Agriculture; and the title of each of the said parts shall be such as to

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YEARBOOK OF THE U.S. DEPARTMENT OF AGRICULTURE

REPORT OF THE SECRETARY.

MR. PRESIDENT: Evidence abounds that more attention and more intelligent thinking are being directed to-day to the study of the fundamental problems in agriculture and in rural life than ever before. The last two years have been fruitful of significant State and Federal legislative and administrative measures designed to foster agriculture, to improve the distribution of agricultural products, and to better rural life. The people of the nation, urban and rural alike, are keenly interested in efforts to increase the supply of the necessaries of life, and recognize the supreme importance not only of making agriculture efficient and profitable, but also of making rural life comfortable, healthful, pleasurable, and attractive. Agriculture has made marked progress in a number of directions, but as an industry it has not kept pace with the other activities of the country. Relatively speaking, there has been a neglect of rural life by the nation. This neglect has perhaps not been conscious or willful. We have been so bent on building up great industrial centers, on rivaling the nations of the world in manufacturing and commerce, fostering these by every natural and artificial device we could think of, so busy in the race for populous municipal centers, that we have overlooked the very foundations of our industrial existence. It has been assumed that we have a natural monopoly in agriculture—that it could take care of itself, and for the most part we have cheerfully left it to do so.

The direction and emphasis of the national thought is changing, and we are witnessing the marshaling of many forces in the struggle for greater prosperity and for better conditions of living in the rural districts. We are witnessing a great increase in the expenditure of money to foster agriculture through all sorts of scientific and practical measures on the part both of the States and of the Federal Government. Material results are forthcoming, and while great civilized nations of the world are in the throes of a deadly and destructive war, the farmers of every section of the Union except one are prosperous and are enjoying their work and its fruits free from the burden of militarism and the threat of wholesale destruction of life and property. Thoughtful men can not fail to be optimistic over the agricultural situation and prospects, but optimism must not blind us to certain shortcomings.

PRODUCTION.

The progress of agriculture reveals itself more particularly in its diversification, in the rise of minor crops to larger proportions, than in the increased production of staple products. For example, dairying in the last generation has become an exceptionally important branch of agricultural economy, the annual production including more than one and a half billions pounds of butter, a half billion pounds of condensed milk, and a third of a billion pounds of cheese, having a value of approximately $600,000,000. The production of orchard fruits exceeds 216,000,000 bushels a year, with a value of more than $140,000,000. The value of the annual production of vegetables is in excess of $400,000,000. The production of hay and forage approximates 100,000,000 tons, with a value in excess of $800,000,000; the poultry products of the United States have reached a point where their annual value is about one-half that of the cotton crop at normal valuations, and marked increases are noted in the quantity and value of the cereals.

The following table is suggestive. Special attention is directed to the statistics of quantity no less than to those of value. Census data for later years than 1909 are not available, but the indications are that the upward tendency in the production of all the commodities included in the table except corn has persisted.

Comparison of acreage and production of various farm products in 1899 and 1909.

[Taken from the Twelfth and Thirteenth Censuses.]

Product.	1899			1909		
	Acreage.	Production.		Acreage.	Production.	
		Quantity.	Value.		*Quantity.*	Value.
Cotton....bales..	24,275,101	9,534,707	$323,758,171	32,043,838	10,649,268	$703,619,303
Cereals:						
Corn..bushels..	94,913,673	2,666,324,370	828,192,388	98,382,665	2,552,189,630	1,438,553,919
Oats.....do....	29,539,698	943,389,375	217,098,584	35,159,441	1,007,142,980	414,697,422
Wheat...do....	52,588,574	658,534,252	369,945,320	44,262,592	683,379,259	657,656,801
Barley...do....	4,470,196	119,634,877	41,631,764	7,698,706	173,344,212	92,458,571
Rye.....do....	2,054,292	25,568,625	12,290,540	2,195,561	29,520,457	20,421,812
Rough rice, bushels	342,214	9,002,886	6,329,562	610,175	21,838,580	16,019,607
Dairy products...	....	....	472,276,783	....	....	596,413,463
Milk ..gallons..	....	7,265,804,304	....	....	[1]5,813,609,474	....
Butter (made on farms), pounds......	....	*1,071,626,056*	....	....	*994,650,610*	*222,861,440*
Cheese (made on farms), pounds......	....	*16,372,318*	....	....	*9,405,864*	*1,148,708*
Poultry and eggs.	....	....	*281,070,698*	....	....	*509,195,232*
Animals slaughtered on farms..	....	....	189,809,229	....	....	270,238,793
All fruits.........	....	....	131,098,798	....	....	217,576,542
Orchard fruits, bushels........	....	212,365,600	83,750,961	....	216,083,695	140,867,347
All vegetables....	....	....	238,531,761	....	....	418,110,154
Potatoes, bushels.	2,938,778	273,318,167	98,380,110	3,668,855	389,194,965	166,423,910
Hay and forage, tons............	61,691,069	79,251,562	484,254,703	72,280,776	97,453,735	824,694,877

[1] As reported from 16,069,298 dairy cows out of a total of 20,625,432 dairy cows. At this rate the total production of milk in 1909 would be 7,462,000,000 gallons.

We know that the wheat crop of 1914 of approximately 892,000,000 bushels is the greatest ever produced in our history, and that the crops of oats, barley, rye, potatoes, tobacco, and hay are unusually large. The cotton crop, forecast in October at 15,340,000 bales, is the second largest. The apple crop, estimated at 259,000,000 bushels, is the greatest ever harvested. The total production of six leading cereals is estimated to have been nearly 5,000,000,000 bushels, or about 428,000,000 bushels in excess of the crop of 1913. For the country as a whole the crop yields per acre were 2.3 per cent better than the average for the past 10 years. The average yield per acre of all the staple crops was 9.4 per cent greater than in 1913, and, except for corn, oats, and flaxseed, greater than the 10-year average.

But after all our efforts, while there is an increased diversification of agriculture and both a relative and absolute increase in important products, such as wheat, forage crops, fruits, dairy products, and poultry, we still note not only a relative but also an absolute decrease in a number of our important staple food products, such as corn and meats. In the former, in the last 15 years there has been no substantial advance. In cattle, sheep, and hogs there has been an absolute decline—in cattle, from the census year of 1899 to that of 1909, from 50,000,000 head to 41,000,000; in sheep, from 61,000,000 to 52,000,000; in hogs, from 63,000,000 to 58,000,000. Since 1909 the tendency has been downward, and yet during the period since 1899 the population has increased over 20,000,000. This situation exists not in a crowded country, but in one which is still in a measure being pioneered, in one which, with 935,000,000 acres of arable land, has only 400,000,000, or 43 per cent, under cultivation, and in one in which the population per square mile does not exceed 31 and ranges from 0.7 person in Nevada to 508 in Rhode Island.

Just what the trouble is no one is as yet sufficiently informed to say. It can scarcely be that the American farmer has not as much intelligence as the farmer of other nations. It is true that the American farmer does not produce as much per acre as the farmer in a number of civilized nations, but production per acre is not the American standard. The standard is the amount of produce for each person engaged in agriculture, and by this test the American farmer appears to be from two to six times as efficient as most of his competitors. Relatively speaking, extensive farming is still economically the sound program in our agriculture, but now it is becoming increasingly apparent that the aim must be, while maintaining supremacy in production for each person, to establish supremacy in production for each acre. The continued solution of the problem here suggested is one which now seriously engages the attention not only of the agricultural agencies of the several States, but also of the Federal Government.

Through every promising approach the Department of Agriculture is studying and attacking the problem of increasing production. Through breeding and selection, the improvement of cultural methods, and the control of plant diseases, experts in plant industry are lending their assistance. They are introducing new crops and better varieties of existing crops from other parts of the world, including drought-resistant plants for the semiarid regions of the West and better forage crops for the South; they are breeding higher yielding varieties of staple and other crops; they are indicating better cultural methods and practices, encouraging standardization, and suggesting utilization and disposal of crops in such manner as to make them yield an adequate return to the producer; they are stimulating the citrus-fruit industry; and they have produced by hybridization new and comparatively hardy types of citrus fruits which will become

important additions to the home supply of useful fruits, especially in the Southern States. They have established new plant industries in various parts of the country, such as date and cotton growing in Arizona and the Imperial Valley of California. They have pointed the way to the continued successful growing of cotton in boll-weevil districts. They are protecting the farmer against seed adulteration. In cooperation with other agencies, especially the Federal Horticultural Board, they are taking effective steps to safeguard the great potato industry of the nation. They have developed grain and cotton standardization to the point where beneficial results can be secured not only in further production, but also in more just and efficient distribution.

In like manner the experts of other bureaus have labored efficiently for the increased production of farm crops. The entomologists have pointed the way to the control or the extermination of many harmful insects. They have developed means for the control of the alfalfa weevil, assisted in the protection of crops against damage by chinch bugs and the Hessian fly, developed sprays for controlling deciduous fruit insects, and lessened the injury to orchards by the apple-tree borers. They have devised protection against the tobacco horn worm, carried on successful work in the eradication of the Rocky Mountain spotted-fever tick, studied the control of insects conveying disease to human beings, and rendered other service of marked value.

The experts of the Bureau of Soils have continued their studies of soils and have prosecuted their investigations into additional sources of fertilizer supply. They have extended the work of surveying and mapping the soil areas of the United States, having surveyed and mapped in detail since the inauguration of the work 329,539 square miles or 211,000,000 acres, and, in addition, have made reconnoissance surveys of 434,000 square miles, or 278,000,000 acres.

THE MEAT SUPPLY.

The experts of the Bureau of Animal Industry have intelligently and zealously prosecuted their tasks, but it remains true that this country faces a serious situation in the matter of its meat supply. Just what factors have brought this situation about no one can define with certainty, and no systematic attempt to define them has been made until recently. Realizing the urgency of the problem, I have appointed a committee, consisting of the best authorities I could discover, to study the subject. This committee is making a survey of the whole field and will report at the earliest practicable moment. Its study embraces an investigation of production and consumption and of the methods of producing, finishing, and marketing meat. When a conclusion is reached, such measures as may be helpful for increasing production and bettering distribution will be inaugurated.

In the meantime, however, certain things are clear, and definite plans for increasing the meat supply are in operation and can be continued with promise of large results.

It is evident that we have been considering the meat supply of the nation too exclusively in terms of the big ranch and of beef animals. Obviously it is important that we continue to help the cattlemen and to assist in further developing the big ranch. No pains will be spared to do this. The department is now spending money to develop the live-stock industry in connection with the reclamation projects and is asking for more. But unquestionably the largest hope for a considerable increase in our meat supply lies in four other directions: First, in a more satisfactory handling of the public grazing lands; second, in systematic attention to the production of beef animals in the settled farming areas of the country, particularly in the South; third, in increased attention to the smaller animals, such as swine and poultry; and fourth, in the control and eradication of the cattle tick, hog cholera, tuberculosis, and other animal diseases and pests.

The present methods of transforming the grasses of the public grazing lands into beef and mutton are generally conceded to be wasteful. It is estimated that under a proper system the quantity of beef and mutton produced on these lands could be increased by at least 50 per cent. The public grazing lands, in addition to 150,000,000 acres in the National Forests, embrace about 300,000,000 acres. Under the present laws any person may graze any number of stock at any time on any part of these 300,000,000 acres of the public grazing lands or grazing lands outside of National Forests. In earlier years, when there were comparatively few cattle on the range, the treatment of the lands as common worked fairly well, but the increased domestic and export demand for meat has resulted in overgrazing. Unseasonable and excessive grazing weakens the vitality of the range plant and permanently reduces the crop. Furthermore, as years have passed the area of the grazing lands has been greatly reduced through the taking up of homesteads, and in many cases the better lands were thus disposed of. There is no doubt that under legislation providing for an intelligent system of handling grazing lands a very large increase in the meat supply of the nation can be secured. This is not mere conjecture. The opinion is based on the experience not only of the State of Texas in handling its public lands, but also on that of the Federal Government in the management of the grazing lands in the National Forests.

For 10 years the United States Government has been conducting a successful experiment in the forests. So quietly has this experiment proceeded that few people have known even of its inauguration, recognized its importance, or appreciated its results. Under the Forest Service system annual grazing permits, with the necessary regulatory provisions, have been in force for nearly a decade. The results have been striking. In 1905, 81 acres supported but one

animal; in 1913, the average was one animal for each 51 acres. This increase of 59 per cent has been due to many factors which can not be detailed here. The net results are that the grazing lands in the forests under permits to nearly 29,000 live-stock growers support 1,600,000 cattle and horses, with their calves and colts, and 7,600,000 sheep and goats and their lambs and kids. In addition, the forest ranges furnished temporary grazing to millions of other animals which passed through the forests under crossing permits. The capacity of the range has not been reached. There is room for more animals on this part of the public domain. It has been demonstrated that under systematic management the grazing value of the lands can be restored and increased, that the range can be made to produce heavier animals, even with increased numbers, and that these lands can be improved faster in use than in idleness. Even with the very moderate grazing fees charged the stockmen pay the Government over $1,000,000 annually. Their gross receipts probably exceed $30,000,000, and their invested capital is more than $100,000,000. A proof of what this constructive handling of the range problem signifies may be found in the desire of many stockmen to have the department's system of grazing extended to the open public range outside the National Forests.

There is no question that the average farmer in the settled areas of the United States generally, North, East, South, and West, can produce without great expense a larger number of beef animals, if only as by-products, to the betterment of his farm economy. In this direction the farmer in the South enjoys unusual opportunities. It is further apparent that farmers everywhere, if they will apply existing knowledge, can largely increase the supply of swine and poultry products, which constitute a large and growing part of the consumption of the average family. In no other way can a con-

siderable addition be so quickly made to our meat supply as through increased attention to poultry and swine on all the farms of the nation, and particularly in the South, where the deficiency is so marked. The annual value of the poultry products alone aggregates half a billion dollars, or 50 per cent of the total value of the cotton produced in the United States. The last census, however, shows a lamentable neglect of live stock in the South. While in Iowa the average farm has 6 milch cows, in North Carolina and Alabama it has less than 2, and in South Carolina 1. While in Iowa the average farm has 35 hogs, in North Carolina and Alabama it has less than 5, and in South Carolina less than 4. While in Iowa the average farm has more than 108 head of poultry, in North Carolina and Alabama it has less than 20, and in South Carolina less than 17. An investigator has recently said that the average farm home in Georgia produces less than 2 eggs a week; about two-thirds of an ounce of butter and two-thirds of a pint of milk a day; one-third of a hog, one-twelfth of a beef, and one-hundredth of a sheep a year for each member of the family; and that the cotton crop of the State does not pay the State's food and feed bill. No Southern State is giving sufficient attention to the production of foodstuffs either for human beings or for live stock. A conservative estimate indicates that Texas imports from other States annually more than $50,000,000 worth of wheat, corn, and oats; Georgia more than $24,000,000; South Carolina more than $20,000,000. Twelve Southern States import more than $175,000,000 worth of these three commodities and $48,000,000 worth of meats, dairy products, and poultry products. It may be admitted that most of these States should not undertake the production of these commodities for foreign or interstate shipment in competition with the great States of the Middle West, but every student of the subject must recognize the unwisdom of the neglect to produce enough of these things

for the consumption of their people and for the laying of the foundation of a prosperous live-stock development.

Too exclusive devotion to a single crop anywhere is unwise for normal times and spells disaster in times of disturbance. It is bound to produce just such a catastrophe as has befallen the South in the present emergency. It prevents the full utilization of land and labor, fails to fill the gaps in the work schedules, and furnishes no reserve.

If farmers in the South had heretofore practiced diversification on a sufficiently large scale, producing their own home supplies, that section would not be in its present hard case. The experts of this department are laboring earnestly to bring about a better direction of the agricultural activities of the South. If this is especially successful the coming season, and a much larger part of the land, labor, and capital of the South is devoted to the production of foodstuffs, relief will be afforded in this emergency, and there will be promise there of a permanent, wiser farm economy. This undertaking will require the cooperation in the South of all the agents of the department, of the farmers, of the business men, and of the bankers. If the department had available an additional $100,000 or $150,000 with which to place a number of experts in live stock, marketing, and other subjects in the field, much greater headway could be made.

But an easier and more definite program for a large increase in the meat supply involves the eradication of the cattle tick, of tuberculosis, and of hog cholera, and the prompt suppression of serious outbreaks of such diseases as the foot-and-mouth disease. The Federal Department of Agriculture inspects meats passing into interstate commerce. Of 57,000,000 animals inspected in the fiscal year 1914, 533,000 were found to be infected with tuberculosis. This disease is increasing. It is estimated that hog cholera caused a loss in 1913 of over 6,000,000 hogs, valued at more than $60,000,000, and that the cattle tick causes an annual

loss of from $40,000,000 to $100,000,000 or more and prevents the proper development of the live-stock industry in the infected area.

The department is now directing the expenditure of a fund of $500,000 for the eradication of hog cholera, and many of the States are likewise spending considerable sums. The two agencies are working in cooperation and are making experimental and field demonstrations in the control of this disease. Unquestionably the appropriation of half a million dollars for the eradication of hog cholera should be continued.

The work of tick eradication is progressing. It has resulted to date in the clearing up and freeing of 220,000 or more square miles, an area exceeding that of Georgia, Florida, Alabama, and Mississippi combined, or greater than that of France or Germany. There still remains an area about double that of the State of Texas, or more than twice that of Germany or France, which is infested. A more vigorous effort with larger funds for the clearing of this area would be wise economy.

Other animal diseases interfere seriously with meat production, and from time to time great actual loss in cattle and hogs and still greater disturbance of industry are caused by the foot-and-mouth disease. This disease affects cattle, sheep, other ruminants, and swine. It manifests itself by abnormal elevation of temperature and by ulcers or vesicles in the mouth and on the feet. It is not necessarily fatal, but frequently affects very seriously the value of the animals. There were outbreaks of foot-and-mouth disease in this country in 1870, 1880, 1884, 1902, and 1908. Since the close of the fiscal year 1914 the sixth outbreak has occurred. The first three, those in 1870, 1880, and 1884, were comparatively trifling. Those in 1902 and 1908 were more grave. The present is the most serious and extensive of all.

In 1902 the outbreak occurred in the New England States. In 1908 it originated in Detroit. The origin of each of these outbreaks was traced to the importation of vaccine virus for the propagation of vaccine for use in vaccinating people against smallpox. The vaccine virus was imported from Japan, where the foot-and-mouth disease exists. Each of these outbreaks was stamped out by methods which have proved most effective in preventing the disease from gaining a footing. These methods involved the killing of all infected and exposed animals, the burying of the carcasses, and the thorough disinfection of all premises with which the animals may have come in contact.

On October 18, 1914, the Bureau of Animal Industry of this department learned that cattle in the vicinity of Niles, Mich., were infected. It was thought for a time that the trouble might be confined to two counties in Michigan and two adjoining counties in northern Indiana, but evidently before the disease was reported and before it was diagnosed shipments of infected animals passed through the Chicago stockyards. Upon tracing shipments from these yards animals infected with the disease were found at points in Michigan, Indiana, Ohio, Wisconsin, Pennsylvania, Maryland, New Jersey, Kentucky, Iowa, and Massachusetts. Subsequent points of infection have been discovered. The existence of the disease in Montana has been traced to animals from the infected area in Wisconsin, and its existence in Washington has been traced from animals which crossed the trail of the Montana herd. The department has taken every step possible to control the disease and to prevent its spread. It has worked in close cooperation with the State authorities and with great numbers of individuals and of associations of individuals. It has pursued its former policy of purchasing diseased and exposed cattle at an appraised value and of slaughtering and burying them. It has established and maintained a very strict quarantine. The ex-

pense of this task will be very great, and it will be necessary to ask the Congress for an emergency appropriation of several millions of dollars. The interests at stake are vast and justify any reasonable expenditure.

It is not possible at the present time to state positively what the origin of the present outbreak was. The disease is highly contagious. It may be carried by birds, dogs, cats, rats, or ruminants, or by human beings passing over territory which diseased animals have traversed. Horses going over infected ground may convey the disease in dirt adhering to their feet. When one animal in a herd becomes affected it has usually spread to all the others. As has been stated, the outbreaks in 1902 and 1908 were traced to vaccine virus. The most plausible suggestion as to the origin of the present outbreak is that it was introduced with importations of an article used in tanning. This article is imported from several countries. There is in the vicinity of Niles, Mich., a small tannery using the article in question, and swine owned by employees of the tannery kept in this vicinity were the first animals known to have contracted the malady. Since the disease exists in a great part of Europe, in the Orient, in South America, and other places, there will be danger so long as there is any trade or travel with such countries. Apparently the only certain way to prevent the introduction of the disease into this country from abroad is absolutely to isolate this nation from others. The only reasonable thing which can be done is to enforce as carefully as possible the inspection laws, to give the Department of Agriculture sufficient authorization and emergency funds to cope with the disease when it does appear, and to institute such scientific inquiry and experiments under absolutely safe conditions as may be practicable in an attempt to discover the cause of the disease and to ascertain and apply the remedy. The present situation suggests the wisdom of legislative action to this effect. If the interval between the sessions of Congress had

been longer, the department would have been without adequate funds to deal with the problem.

FARM ECONOMICS AND BUSINESS METHODS.

A different but strikingly important aspect of production and of farm operations is the application of economic principles and of sound business methods. This subject has received little consideration. In every other industry successfully prosecuted the employment of sound business principles from the outset is regarded as a prerequisite. In this direction, as in others, farming has lagged behind, and the several farming activities have been too largely conceived as being separate rather than as closely interrelated. It is highly necessary that the farmer, as well as any other business man, should know at all times just how his business stands, what parts are profitable, what unprofitable, and how he should redirect his activities to assure success. For this purpose the farm must of necessity be looked upon as a whole. It is the object of the Office of Farm Management to do this. The service of the economist should be enlisted in all our agricultural undertakings. All agricultural enterprises and the work of all agricultural establishments are economic in their character, and yet it is true that up to the last two years neither the farm as such nor any institution or establishment dealing with the farm has invoked the assistance of the economist. For the most part the economist has not realized the obligation resting upon him and has paid scant attention to the urgent economic problems in the field of rural life. It is probably true that not more than 10 or 12 of the economists of this country could qualify as experts in rural economics. Their attention has been somewhat exclusively absorbed by problems growing out of the industrial life of the nation and out of its international relations. The emergence of acute business problems in agriculture and the complexity of the

problems of distribution and organization justify a different attitude on the part both of the economist and of the authorities responsible for agricultural leadership. The inauguration of work in farm management is a hopeful indication of change.

The business of the student of farm management is to make an analysis of the operations of the farmer, to study the proper adaptation of the type of farming to local conditions, such as soil and climate, the size of the market, market demand and transportation, the quality of the farm business, its diversity, its organization, the distribution of farm enterprises, and the costs of each sort of product. The investigations of the Office of Farm Management are yet in their infancy, and there is much to learn in this branch of agricultural science, but the inquiries thus far pursued furnish a deeper insight into the causes of success and failure in farming and give promise of helpful results in the increase of production on a profitable basis.

DISTRIBUTION.

A constructive agricultural program must of necessity contemplate distribution as well as production, and, vital and urgent as are the direct problems of production, even more important in a sense and more immediately pressing are the problems of distribution and marketing. The solution of problems in this field is essential not only for the increase of production but also for the elimination of injustice, and for the guaranty, on the one hand, to the producer that he shall receive a fair reward for his labor and the right value for the specific product which he sells, and, on the other, to the consumer that he shall receive the exact commodity for which he pays a specific price. The attempt by governmental agencies to solve problems of distribution and marketing is recent. Considerable headway has been made, and the indications are that the thought

both of the State and of the nation has been keenly aroused and that further effective measures will be adopted. One of the greatest weaknesses of American agriculture at the present time arises from the lack of a knowledge of the facts of distribution, of business organization, of cooperation, and of resident leadership. Attention has heretofore been directed to the new enterprises of the department in marketing, in cooperation, rural credit, and the general organization of rural communities for their intellectual, sanitary, and social betterment. Already the Congress has laid the foundation for work along these lines by making available a fund of $240,000 and by enacting the cotton futures act.

Other measures of great importance, such as those dealing with cotton standards, grain standards, a permissive warehouse system, and land-mortgage banks, have been pushed toward completion. Generally speaking, all these measures have for their object the elimination of waste, the systematizing of the processes of distribution, the injection of adequate business methods into these activities, and the development of the requisite degree of business cooperation among farming units. Several of these measures merit further comment.

MARKETING.

Sufficient indication of the scope of the work of the Office of Markets was given in the department's last annual report. Initiated a little more than a year ago with an appropriation of $50,000, an expansion was made possible by the increase in the amonnt to $200,000 in the current appropriation for the department. In a new and untried field of this kind the first concern must be to secure the requisite number of trained men, very difficult to find, who can undertake efficiently the several lines of investigation. The organization has now reached a fair stage of development and is actively prosecuting its tasks. It has

obtained much reliable information concerning cooperative marketing and purchasing. It has demonstrated that cooperation in some form is much more prevalent in the United States than is generally believed. A record of more than 8,500 marketing associations, about 2,700 cooperative and farmers' elevators, 2,500 cooperative and farmers' creameries, and more than 1,000 cooperative fruit and produce associations has been secured. While the survey is not complete, it is reported that over a billion dollars' worth of agricultural products are annually marketed by cooperative and farmers' marketing associations.

The majority of these associations have furnished the office detailed statements of their plans of organization, of the products handled, of the forms of business, and of other important items, including constitutions, by-laws, and financial statements. The conclusion seems justified that in communities where farmers' associations are properly constituted and operated better results are obtained than under a system of individual handling. Advantages present themselves in the standardizing and packing of products and in the discovery of the best daily market. Much information has been secured as to the laws of the various States under which such organizations may be created. The effort is being made to determine the principles on which the enterprises that have succeeded have operated and those upon which the enterprises that have failed have proceeded. The business practices of the enterprises have been carefully considered, and the results of investigation are being tabulated and formulated. At the earliest possible moment the results will be incorporated in circulars and bulletins. Likewise, inquiries have been set on foot concerning market centers, the market surplus, the rate of movement, the outlets for commodities, the prices of specific products by definite trade areas, and the possibilities of increasing distribution in an economical way.

Lists of producers, producers' organizations, shippers, transportation agents, and officials from whom information on specific perishable products may be secured are being compiled. For example, the records show that the number of points from which commercial shipments are known to originate for certain specific products are as follows: Strawberries, 900; peaches, 1,800; tomatoes, 600; cabbage, 1,700; onions, 1,500. A special inquiry has been made concerning the commercial storage of cabbage and onions in the North, to guide growers in southern areas. In all these directions information has been furnished to producers in different sections. There have been special investigations of the marketing of peaches and cantaloupes in Georgia; of cantaloupes and truck crops in North and South Carolina; of cantaloupes, strawberries, and truck crops in Virginia; of peaches, cantaloupes, and strawberries in Delaware; of peaches in Maryland and West Virginia; of peaches, strawberries, and truck crops in New Jersey; of peaches and truck crops in Pennsylvania; of potatoes in Maine; of cantaloupes and cabbage in Colorado; of truck crops in Mississippi and Texas, and of fruit and potatoes in Arkansas, Missouri, Tennessee, and Kentucky. Much advice and assistance has been furnished to growers in these sections.

City marketing and distribution, including the various types of public markets, wholesale terminal markets, and auctions and other methods of distributing food products in cities, have likewise been the subject of investigation. At Jackson, Mich.; Providence, R. I.; Trenton, N. J.; Philadelphia, Pa.; St. Louis, Mo.; and Jersey City, N. J., in response to requests from city officials or producers' organizations, the municipal public market situation has been analyzed. Personal investigations have been followed by extensive reports containing specific advice regarding suitable types of markets, their design, cost, construction, and advanta-

geous location, the arrangement of transportation facilities, and many other details. Municipally and privately owned public retail markets, producers' wholesale and retail markets, wholesale terminal markets, and auctions have been studied in Boston, New York, Norfolk, Baltimore, Washington, Albany, Rochester, Buffalo, Cleveland, Detroit, Chicago, Madison, Pittsburgh, Cincinnati, Columbus, Toledo, Dubuque, Des Moines, Kansas City, and Denver. Details have been secured of market costs, maintenance, construction, sanitation, location, offerings, prices, and the service, or lack of it, which these markets render the people.

A special object of inquiry has been the possibility of marketing by parcel post and express. Many experiments have been conducted by sending, receiving, and examining experimental shipments. Exhibits have been made at many gatherings. The first experiments in this direction were made with eggs, in family-size lots, the results of which have been published in Farmers' Bulletin No. 594. It has been found that where proper care in packing and handling commodities is exercised the marketing of certain products by parcel post and express can be profitably undertaken.

The marketing of live stock, of meats, and of animal by-products, has been investigated. The object has been to determine the relative efficiency of the marketing of beef cattle in the central and local markets in the various producing areas of the United States, and to ascertain in what particular improvements may be made.

The areas selected for these studies were the East, the South, the corn belt, the Northwest, the Southwest, and the Pacific slope. Data have been obtained chiefly by selecting typical shipments of cattle whose approximate cost of production is known, by following them from the farm, ranch, or plantation through the stockyards, packing houses, and wholesale

and retail markets to the consumer, and by keeping itemized accounts covering the transportation, selling, and slaughtering of the live stock and the distributing and retailing of the beef. As far as possible, normal factors of loss, such as mortality, shrinkage, condemnations, bad accounts, and depreciation, and also items of expense which the consumer must pay indirectly, such as rent, heat, light, handling, storage, cutting, and delivery, have been considered in these statements. In this manner twelve lots of beef cattle have been traced from Oregon, Montana, Kansas, Texas, Alabama, Illinois, and Virginia to the open market at Portland, Oreg., Fort Worth, Kansas City, East St. Louis, Chicago, and Baltimore. The beef yielded by the cattle has been followed to its destination, the principal shipments having gone to Portland, Oreg., Seattle, Indianapolis, Fort Wayne, Detroit, Cleveland, Baltimore, Jersey City, New York, Brooklyn, Providence, Boston, and a number of smaller eastern cities, and ultimately having been sold to family, hotel, restaurant, and dining-car trade.

Information has also been obtained relative to the methods and cost of dressing and handling beef by local butchers in various sections and under various conditions. Tests of this kind have been arranged at Urbana, Ill.; Auburn, Ala.; South Haven, Mich.; at the municipal abattoir at Paris, Tex.; and at the farmers' cooperative packing house at La Crosse, Wis.

A directory and descriptive file of all centralized live-stock markets in the United States, including their railroad facilities, stockyard equipment, selling agencies, buying interests, number and character of receipts and shipments, and the sources of supply and outlets for finished meat products and by-products, is now being compiled.

Further investigations and a more complete analysis of the facts in hand will be necessary before definite conclusions

can be stated as to the relative cost of transporting, slaughtering, wholesaling, and retailing beef, and the extent to which the cost may be reduced in each instance. Each of the large markets draws its supplies from at least several States, and some of them from a larger area. During the present grass season, for example, Chicago has received Mexican, Canadian, and Florida cattle at about the same time. Steers raised in California by an Oregon operator have been shipped through Denver to Omaha and the beef sent to points on the Atlantic coast. Hogs raised in Illinois and sold at Indianapolis have been slaughtered at Boston and a part of the cured bacon shipped to Los Angeles. Michigan dressed veal calves expressed to South Water Street commission houses at Chicago have been returned to the identical shipping points from which they came to fill orders from local retail markets. The importance of this work and the results thus far obtained justify a larger support of this service, especially as its organization has now progressed to the point where it is possible to utilize ampler funds with the requisite efficiency.

GRAIN AND COTTON STANDARDS.

The matter of the standardization of grades of grain and cotton is of great practical consequence to the farmer and to farming. This is a work upon which the experts of the Bureau of Plant Industry have been engaged for years. During the last year the adequacy of the data accumulated with regard to corn made possible the formulation and promulgation of grades for that grain which, if generally adopted and uniformly applied throughout the country, will simplify the relations between producers, dealers, and consumers. Under these grades, fairly used, the grower or shipper of a superior quality of grain will be in a position to demand from the buyer the fair value to which the quality of his product entitles him. On the other hand, the producer of a product of inferior quality will receive a lower return.

The beneficial influence upon agriculture of a uniform system of grading staple crop products will be very great through the financial incentive afforded the farmer to improve the quality of his product by the careful selection of varieties, skillful culture, and adequate and effective methods of harvesting, handling, and protecting it while in his hands. Advice that he improve his methods, no matter how sound and well intended, will not make and ought not to make much impression upon him unless it can be clearly demonstrated that it will pay him to improve his product and his handling methods. Concrete evidence of the profitableness of this course in the form of larger net returns for his output will do more than any other single factor to arouse action and effective interest in crop improvement. Investigation of the handling and standardization of other staple grains, particularly wheat and oats, is proceeding. It is gratifying that a considerable proportion of the State grain-inspection departments and commercial organizations maintaining grain-inspection departments located in the grain belt and the Gulf coast sections have already adopted the Government grades for corn or have declared their intention to adopt them.

In addition to the continuance of the preparation and distribution of standard grades for cotton, promulgated under statutory authority some years ago, investigation of the spinning value of those grades has recently been undertaken with a view to determine as accurately as possible the relative value of the various grades through tests conducted on a commercial scale. Methods of determining the exact length of staple cotton have been developed, which may eventually be applied in the cotton trade. Measures for securing the adoption of grain and cotton standards in trade have occupied much of the time of the Congress, and the indications for their enactment into law are favorable.

WAREHOUSE SYSTEM.

Another proposal is that for a permissive warehouse system for grain and for cotton. The study by the department of the warehousing of grain has not proceeded as far as its study of the warehousing of cotton, but this work is being prosecuted actively, and the results should be available in the near future. Interesting results have already been furnished by the investigation of the cotton-warehousing situation. A detailed survey of the State of Georgia shows that there are in that State more than 1,000 warehouses in operation. Reports from 700 of these give a storage capacity of 1,200,000 bales uncompressed. The remaining 300 probably have a total capacity of at least 300,000 bales. To these may be added the storage houses belonging to the cotton mills of the State, which take care, approximately, of 400,000 bales. In North Carolina there are 129 warehouses, with a storage capacity of about 200,000 bales, and the mills of the State can store 375,000 bales. The situation in South Carolina, Alabama, and Mississippi is similar to that in Georgia. Virginia, Tennessee, Florida, Louisiana, and Texas have warehouses with a storage capacity exceeding the annual production, but these are located for the most part at shipping points, such as Norfolk, Memphis, Jacksonville, Pensacola, New Orleans, Houston, and Galveston.

Comparatively few of the small towns have warehouses. Taking the entire cotton belt, it is probably true that the warehouses now in existence could store the cotton that would be offered during any ordinary season, but the warehouses are not evenly distributed. Most of them are constructed without reference to the standards recognized by underwriters and have to pay a high insurance rate. Few of them are bonded, and financial institutions which might advance money on cotton certificates from bonded warehouses are cautious in dealing with them. If the ware-

houses in existence were remodeled so as to comply with the underwriters' requirements and were bonded, and if adequate business methods were adopted, the financing of the cotton crop would be materially improved. Such a system would furnish relief in times of emergency and would form a useful part of a normal distributive system. It is probable that a Federal law for a permissive warehousing system would stimulate this desirable development.

COTTON FUTURES ACT.

The Cotton Futures Act is the first definite, systematic, legal approach to the solution of difficult problems in this field of distribution. Interest in the economics of the cotton situation has grown rapidly in recent years and has been especially marked during the present season because of the difficulties arising out of the European war. For many years there has been a growing dissatisfaction with the future markets as a means of price insurance. The demand for reform in certain practices and methods of the exchanges resulted in the passage of the futures act, which is designed to increase the safety of the future contract as an insurance and to limit somewhat the possibility of manipulation.

The enactment of this legislation is of importance to cotton growers because of the fact that in normal years the price when the farmer sells is usually based directly on the quotations of the future market. It is generally admitted that the undesirable features of future transactions are due to the number of different standards in use in the markets, to the fixed-difference system of establishing the value of other grades than middling, to the fact that very low qualities of cotton suitable for spinning use by only a few mills sometimes compose the larger part of the warehouse stock of an exchange and are deliverable on contract, to the fact that tenders of cotton under contracts do not indicate the qualities

to be delivered, and to the fact that under the pro forma delivery practice several weeks sometimes elapse before the person who is obligated to receive cotton knows the grades tendered to him, for which he has contracted to pay at the time of delivery.

The act, by prescribing a form of contract, provides that future contracts must be based on uniform standards established by the Department of Agriculture; prohibits the pro forma deliveries and the tendering of cotton of less than seven-eighths inch in staple in settlement of future contracts; provides for the settlements for grades above or below the basis grade in accordance with prevailing commercial differences; allows an appeal to the Department of Agriculture in case of a dispute as to grades, staple, or quality of cotton tendered in settlement; lodges power with the department to ascertain commercial differences actually prevailing in the spot markets, and thus to safeguard the exchanges from unintentional error which might subject their contracts to taxation; makes it the duty of the department to determine which are bona fide spot markets, and to designate the ones which shall be used as a basis for determining commercial differences; and imposes a prohibitive tax upon contracts for the future delivery of cotton on a basis price if they do not conform to the terms of the act.

The act as a whole is constructive and regulatory, not destructive or oppressive. It recognizes that the exchanges, when they are properly conducted, may benefit both the purchaser of raw cotton and the manufacturer of goods. The administration of this act has been intrusted immediately to the Office of Markets in collaboration with the Bureau of Plant Industry. A new standard set of grades, more truly representative of American cotton than any hitherto in use, has been prepared. The requisite surveys have been set on foot, tentative regulations have been prepared, and hearings held with a view to secure advice and

suggestions for the revision of the regulations and the adoption of them in their ultimate form. No effort will be spared to lay the foundations for the enforcement of the act and to give the necessary information at the earliest possible moment, so that the exchanges of the country which desire to do so may operate in accordance with the terms of the new law even before it becomes effective.

RURAL CREDITS.

Closely related to the production and distribution of farm products is the securing of capital by farmers on better terms. This problem has attracted the profound attention of the country and still awaits a full solution. The difficulties arise partly from the diffusion and sparseness of the rural population, partly from the failure of proper business adjustment, and partly from the inadequacy of the security which part of the farming population normally can offer for loans. The problem is one of extending the banking machinery and facilities more intimately into the country districts for the convenience and the assistance of the rural population and of the effective mobilization and utilization of the resources of the country people themselves.

The chief difference of opinion arises over whether there should be special aid furnished by the Government. There seems to be no emergency which requires or justifies Government assistance to the farmers directly through the use of the Government's cash or the Government's credit. The American farmer is sturdy, independent, and self-reliant. He is not in the condition of serfdom or semiserfdom in which were some of the European peoples for whom government aid was extended in some form or other during the last century. He is not in the condition of many of the Irish farmers for whom encouragement and aid have been furnished through the land-purchase act. As a matter of fact, the American farmers are more prosperous than any other

farming class in the world. As a class they are certainly as prosperous as any other great section of the people; as prosperous as the merchants, the teachers, the clerks, or the mechanics. It is necessary only that the Government, so far as geographic and physical conditions permit, provide machinery for the benefit of the agricultural classes as satisfactory as that provided for any other class, and this the Government has attempted and is attempting to do.

It is the judgment of the best students of economic conditions here that there is needed to supplement existing agencies a proper land-mortgage banking system operating through private funds, just as other banking institutions operate, and this judgment is shared by the leaders of economic thought abroad. The national banking system up to the present time has labored under restrictions imposed by law which made it impossible for the national banks to solve the problems in the most effective way. State banks with fewer restrictions, with smaller capital requirements, and ability to lend on real estate have established more intimate touch and have perhaps rendered greater assistance. Likewise certain agencies, such as building and loan associations, insurance and mortgage debenture companies, and the cooperative credit associations recently created by State legislation in Texas, Massachusetts, New York, and Wisconsin, operate to extend capital to the farming districts, and thereby in a measure tend to cut down the rate of interest.

When the national banking law, commonly called the Federal Reserve Act, was under discussion in Congress, the matter of farm credits was considered and debated, but it was decided that the subject as a specific program should be separately dealt with in another act. The Federal Reserve Act was passed with a view to the improvement of the banking conditions of the country in the interest of all classes; to the restoration of normality in banking; to the

establishment of a reserve or banking power which could be utilized in times of emergency; and therefore with a view to secure good banking at all times and to prevent panics. It is not a banker's law, or a business man's law, or a manufacturer's law, or a farmer's law; it is a law for all classes—for all the people. However, there were incorporated into the act several very important provisions which had in mind specifically the needs of the farming classes and the possibility of extending banking facilities to the rural districts.

It was specifically provided that a Federal reserve bank might "discount notes, drafts, and bills of exchange arising out of actual commercial transactions—that is, notes, drafts, and bills of exchange issued or drawn for agricultural, industrial, or commercial purposes, or the proceeds of which have been used or are to be used for such purposes." The Federal Reserve Board was given the right to define the character of paper thus eligible for discount. It was further distinctly provided that nothing in the act should be construed to "prohibit such notes, drafts, and bills of exchange secured by staple agricultural products, or other goods, wares, or merchandise from being eligible for such discount." It was provided that the ordinary notes, drafts, or bills admitted to discount should have maturity at the time of discount of not more than 90 days, but that notes, drafts, and bills drawn or issued for agricultural purposes or based on live stock might have a maturity not exceeding six months. Not only is paper arising out of agricultural transactions made eligible under the act, but it is given a longer maturing period than other forms of paper. This apparent discrimination arose naturally out of the fact that agricultural operations are seasonal and involve a longer period than ordinary commercial transactions.

Again, it is provided in the act that national banking associations not situated in the central reserve cities may lend on improved and unencumbered farm lands within the

Federal reserve district, and that such loans may be made for any period up to five years. Such loans may not exceed 50 per cent of the actual value of the property. Any national bank under this provision of the act may lend on farm lands an amount in the aggregate equal to 25 per cent of its capital and surplus or one-third of its time deposits. The Federal Reserve Act, therefore, so far from discriminating against the farming classes, distinctly bears them in mind, and while not discriminating in favor of them, takes just and particular knowledge of their requirements.

The matter of additional legislation concerning farm credits was promptly brought to the attention of Congress by the President at the regular session in his annual message, and many experts have been giving persistent and careful attention to the problem.

The explanation of why special banking arrangements were devised abroad, but have not been extensively planned and operated in this country, is to be found in the difference in economic, social, and banking habits and conditions. This is the only large country that may be said to have the ordinary banking habit developed in a high degree, with banking and lending associations democratized and in touch with the masses of the people. The great masses of people in a number of European countries do not have the ordinary banking habit and know little about banking practices. The habit of depositing money in banks, of checking against such deposits, and of making loans through banks in such countries is not general. This may be illustrated by a reference to the Bank of France. This bank, with a billion dollars of bank notes, has only $285,000,000 of deposits. A bank can utilize its assets either through notes or through discount and deposit and checking. In this country the assets of a bank are utilized to a slight extent through bank notes, the total volume being about $725,000,000, while the total deposits in all the banks are $17,000,000,000. This

testifies to an unusual development of the banking habit among our people. Partly because of the lack of the ordinary banking habit on the part of European peoples, partly because of the lack of banking facilities, and partly because of other social and economic factors, special agencies had to be devised. There was great need for some addition to their machinery. The land mortgage and the cooperative credit arrangements grew up of necessity. Likewise, the savings banks were created for similar reasons. It is noteworthy that only recently have savings institutions been established in great numbers in this country, and that still more recently the Government postal savings system has been evolved.

Notwithstanding the fact, however, that the people of the United States have ampler financial agencies than any other in the world, and have developed the habit of using these agencies to a greater extent than any other people, students of rural problems have been keenly alive to the need of further improvements. They have insisted upon extensions of the national banking facilities and the creation of special agencies in intimate touch with farmers with a special view to the betterment of financial conditions in the country. At least two definite measures have been prepared and have received special consideration. They are similar in many respects. They provide, in brief, for land-mortgage associations with small capital, which may make loans on farm mortgages within a district of a State or within a State to the extent of 50 per cent of the real values of the farms. The money arising from such loans is to be used for productive purposes on the farm on which the security is based. It is contemplated in one way or another, either through separate associations or through a central agency, that debenture bonds may be blanketed on the mortgages and offered to the public. It is proposed that the operations of the system shall be supervised by a central agency in Washington and

that there shall be adequate safeguards in the way of examination and inspection. It is thought by students of the question that such debenture bonds would be safe, would attract capital, and would bring into the investment field, especially, small holdings scattered through the country which do not now easily find satisfactory investments. A plan of this kind, operating through private funds, should work safely and would probably result in a short time in systematizing credit transactions in rural districts and in reducing the rate of interest.

The Office of Markets and Rural Organization has continued its study of rural credits. Information bearing on farm-mortgage loans has been secured from two-thirds of the savings banks, trust companies, and State and private banks in the United States. The estimated total of farm mortgages held by these banks as loans exceeds $930,000,000. This fund is very unevenly supplied. Iowa banks alone furnish nearly 100 millions. Illinois and New York approximate 85 millions each, California 67 millions, and Missouri 58 millions. In Indiana, Vermont, and Minnesota the sum in each exceeds 45 millions. The total of farm mortgages held by these banks in the 10 States of the cotton belt is approximately the same as that held by Iowa banks.

Bankers in many States, especially in the Middle West, furnish almost as much money for farm loans through their activity as middlemen as they do through loans from their own bank funds. In such cases the banker acts as an agent, usually for some insurance company, mortgage company, or other bank. It is estimated that approximately $565,000,000 is thus handled through members of State, private, and savings banks and trust companies.

Information secured from insurance companies shows that more than $600,000,000 of their funds are invested in farm-mortgage loans. While mainly confined at present to the corn belt, these investments are being extended into the

South and West. The companies have trained field inspectors or rely upon the statements or guaranties of local agents as to land values. Insurance companies usually limit their loans to 40 per cent of the value of the security and to a fixed maximum per acre. The prevailing period of such loans is five years, with the privilege of prepayment on interest dates.

The business of existing mortgage companies in the United States is often that of agents or brokers who bring borrower and lender together and render other services connected with mortgage loans without assuming liability. Such business can be built up with very little capital. The mortgage is made out directly to the lender, who assumes all responsibility. It is evident that the market for such loans is restricted to investors who know the nature of the security, who are willing to lend the particular amount desired, and who will assume all risks.

A limited number of companies deal in mortgages as a jobbing or merchandise business. The mortgages generally are sold after suitable investors have been found. A few of these companies retain ownership in a portion of the mortgages, deposit them with a trust company, and issue debentures secured by the mortgages as well as by the capital of the company. The debentures are issued in even amounts of $100 and upward and for varying periods, affording the investor some of the usual conveniences of bonds. However, inasmuch as the purchaser of a debenture does not know the particular mortgages used as security he must rely on the integrity and solvency of the company to protect his investment.

The students of rural credit recognize the desirability of another piece of legislation which may probably be had at the hands of the several States or of the Federal Government, namely, legislation authorizing and encouraging local personal cooperative credit associations. Some States have

already taken steps in this direction and others are contemplating taking them. The Department of Agriculture has made earnest investigations in this field and is in position to offer suggestions as to legislation and as to the form and operations of rural credit cooperative associations. Such associations as these will perhaps render their largest service in the sections of the country where there are many small farmers whose individual resources may not be sufficient to enable them to secure the requisite credit. Their largest field for operation would probably be the South. Characteristics of such associations of small farmers are: Unlimited liability of members; the pledging of the faith of each to the other and of the whole to the lender; the use of funds for clearly defined productive purposes; and the supervision by the association of the use made of the funds. It has been objected that the feature of unlimited liability will prevent the organization of such associations in this country, but in certain sections of the country the liability of small farmers is already unlimited, and this could not be said to be an insurmountable obstacle.

In reference to such proposed associations, as well as to land-mortgage banks, it is of the utmost importance that attention be centered on the use which may be made of borrowed money. It is of high importance that there should be guaranties of the use of funds secured for productive purposes on the farms covered by mortgages or other obligations; otherwise, the field for speculation will be opened and more harm than good may result. The investigations of the department indicate that a relatively small number of the banks of the country pay any attention whatever to the purposes for which loans are made, and in replies to inquiries many of the banks reporting did not even attempt to give data bearing on this important point.

The Office of Markets and Rural Organization has continued its investigation into the field of personal credits.

From data gathered it appears that the State, private, and savings banks and trust companies supply approximately $1,000,000,000 for short-time loans to farmers and that national banks furnish $750,000,000. As may be expected, because of the differences in the relative importance of agriculture in various States, these short-time loans are very unevenly distributed. The funds are used chiefly in the financing of cattle raising, feeding, and marketing, of dairying, of hog and sheep raising, and of grain and cotton growing and marketing.

GOOD ROADS.

Good roads are equally intimately related to both the production and the distribution of farm products. They are prerequisite not only to economical production and distribution but also to the promotion of the broader life of the communities. The great need, obviously, is for roads which shall get products from the farm to the nearest railway station, enabling the farmer to haul when he can not sow and reap, and to haul at a lower rate, to transport his children to consolidated schools, and to enjoy comfortably his social enterprises. The railway will continue for an indefinite time to be the nation's highway. Emphasis is needed on the community road. It is estimated that it costs 23 cents under existing conditions to haul a ton a mile on the average country road, and that this could be reduced by one-half if the roads were improved. The problem is partly, of course, one of funds, but even more largely one of methods, of instrumentalities, and of administration. The United States to-day is spending annually the equivalent of the huge sum of $200,000,000 for roads, an enormous increase in the last decade. Much of this is directed by local supervisors, and it is estimated by experts that of the amount so directed from 30 to 40 per cent is, relatively speaking, wasted or misdirected. Less than half

the States have expert State highway commissions, and very few of them have any sort of expert local machinery.

The problem, so far as the Federal Government is concerned, is how to inject its assistance into the situation primarily so as to secure efficient expenditure. The people of the nation are intensely interested in this problem, and pressure will continue for action by the Federal Government. The matter is of sufficient importance to justify again an attempt to indicate the wise course of action in case the Federal Government is further to expand its activities and lend direct support. If direct Federal aid is to be expended, it should be done only under such conditions as will guarantee a dollar's results for every dollar of expenditure, and, as has been stated, the emphasis should be placed on the community road, on the necessity of improvement in an economical manner of the dirt roads of the country, particularly through the cheaper forms of construction, such as sand-clay, gravel, and earth. Legislation should provide for cooperation between the Federal Government and the States, and that the State through an expert highway commission should be the lowest unit with which the Federal machinery should deal. If the Federal Government recognizes any other unit than the State highway commission, it will complicate the situation in those States where satisfactory developments have taken place and it will retard movements in the right direction in other communities. If, on the other hand, the law recognizes only a central highway commission it will strengthen the hands of those that now exist and secure the creation of such bodies in the 26 States that do not now have them. The mere creation of such bodies in every State would be a marked gain. The Federal department and the highway commission of each State should be empowered jointly to select the roads upon which the work is to be performed and to determine the manner

and methods of constructing roads under projects mutually agreed upon previously.

It seems desirable that if Federal money is to be expended, it should be limited to construction projects and should not be used for maintenance, and, furthermore, because of the time required for the development of the requisite machinery and because of the difficulty of assumption by either jurisdiction of a large initial burden, the Federal appropriation should at first be relatively small.

Expenditure for maintenance would involve the Government in a very unsafe and uncertain course. It would be a continuing appropriation on a vast scale. It would seem only proper that if roads are secured, the States and the communities should maintain them. I clearly recognize that it is difficult to draw the line between construction and maintenance on the simpler forms of road; but, after all, the line can be drawn and would be much clearer if proper methods of construction were pursued.

As an automatic check to a drain on the Federal Treasury in case Federal aid is extended, provision should be made that each State shall make available for construction at least as much as is set aside by the Federal Government, preferably twice as much, and that it shall give a satisfactory guaranty to maintain the roads constructed. On all projects on which Federal money may be expended in cooperation with the States it should be provided that the two authorities shall fully cooperate, and that before Federal money is made available for any projects such projects shall have been mutually agreed upon by the Federal department and the State authorities, with clear understandings as to methods of construction, specifications, materials, and the development of a road system.

It will be objected by some that this suggestion involves an invasion of State rights. As a matter of fact, it simply looks to the use of Federal money for the purpose for which

it may be voted, and to its efficient expenditure. Those who fear invasion of State rights can easily obviate the danger by declining to ask for Federal money. If they demand Federal money, they can not easily decline to have its proper and efficient expenditure safeguarded. It is no argument to assert that State agencies may be trusted. As a matter of fact, they are not the officials who have to assume the responsibility for the expenditure of Federal money. We do trust State authorities fully to vote and expend State funds. They assert the right to look after the expenditure of State funds and do so with great jealousy. They should show a willingness to have the Federal officers assist in the supervision of the expenditure of Federal moneys.

One thought should be clearly held in mind, namely, that it is highly unwise to discourage State and local effort. Only in recent years have the States begun seriously to attack many of the problems which it was originally contemplated they should solve. If the Federal Government were to make a very large appropriation, it is not improbable that the States would begin to look to it somewhat exclusively for funds with which to build roads. Such a development would be calamitous.

DISSEMINATING INFORMATION.

The nation is spending through the department large sums in acquiring agricultural information. It would be little short of criminal to spend millions of dollars to acquire information and not to use every possible efficient agency available for placing it at the disposal of the people as promptly as possible, for it is certain that if the average farmer could be induced to apply what the experts now know or what the best farmers practice, a revolution could be brought about in the agriculture of the Nation. It has seemed a matter of great urgency that through every proper

channel at the earliest possible moment there be brought home to the 6,000,000 farm families of the Union the knowledge which the department has acquired and is increasingly acquiring. It is the purpose of the department, with as little delay as possible, through every proper medium to give the knowledge which the department possesses as the result of investigations and field work to all the people who desire it or should have it.

Up to a comparatively short time ago the printed matter conveying information was in the form of bulletins and circulars limited to issues of from 2,000 to 40,000 copies. Not infrequently much time was required for the final preparation of the bulletin, for its printing, and for its distribution. In the nature of things, the bulletins could not reach a great mass of the farmers. Many farmers did not even know of the existence of the department and knew nothing of the service it could render. They did not know of the existence of bulletins which would be helpful to them or how to secure them; and in many cases they could secure them only with considerable inconvenience and some expense. Furthermore, the bulletins were not infrequently difficult to interpret, to understand, and to apply. Emergencies frequently arise in which information, to be of value, must be placed within a few hours in the hands of farmers. The delay in issuing official printed bulletins and mailing them often defeated the possibility of service. In case of distant States the mailing time to and from Washington caused from 12 to 14 days to elapse before the desired information could be delivered. In many cases, where the department's supply of printed publications was exhausted, it has been necessary to inform the farmer that he must send 5 or 10 cents to the Superintendent of Documents to obtain the desired publications. This involves on the farmer's part the writing of a second letter to the Superintendent of Documents and another delay of 12 or 14 days. In cases actually worked out, where the publication desired

was not available from the department, farmers in Pacific Coast States have been unable to obtain the information in less than 30 days.

As the result of long observation, as well as of careful survey, the department reached the conclusion that, aside from the conveying of information by competent persons directly to farmers on their farms, the most efficient medium for reaching the farmers was the agricultural press, and that, next to this, the most efficient mediums were the daily and weekly newspapers which devoted space to agricultural matters. It was ascertained that these journals would gladly use material if it were furnished to them in such form as to be readily available. It seemed desirable to have an office which could do this, because through it the matter could be more accurately and adequately presented. It was also discovered that correspondents of representative journals would telegraph to their home offices items giving important and timely agricultural information bearing upon pressing problems.

This whole matter was made the subject of a conference with the chiefs of bureaus, other officers of the department, and experienced writers and journalists. As a result of this conference the Office of Information was established.

Not only has the establishment of this Office of Information resulted in a fuller knowledge on the part of the farmers of the fact that they can get assistance and that bulletins are available, but it has led to a much larger call for bulletins and supplied a vast amount of information to the press.

During the fiscal years 1913 and 1914 the staff of the office prepared and issued in mimeographed form to the agricultural press and newspapers 512 summaries or condensed statements of fact and 30 special items to the press associations covering quarantine notices and supplementary statements regarding crop estimates. In addition, each week from 10 to 20 pages of typewritten material have been pre-

pared specially and supplied to rural weekly papers. In every case the summary was circulated only to editors in the geographic or agricultural territory to which the information was directly applicable. The office also cooperates with many editors or their representatives, and others who write, or telephone, or call in person for special information needed by them in the preparation of agricultural articles. It answers daily many letters requesting information not covered directly by existing publications or not falling within the province of any one of the department's bureaus or offices.

While no effort has been made to keep a complete account of the use of material by publications, a computation of the circulation shows that the information issued through the office is appearing monthly in over 250,000,000 printed pages. This computation does not include the total circulation of this information. It does not include the department's material which appears in the pages of nearly every agricultural journal and much special material on practical farming carried by weekly country papers. As a result of this service many daily papers which heretofore had given no attention to agriculture are now devoting considerable space to publishing the department's brief, simple statements of direct local value as to improved methods of farming or as to control of crop pests. These reach the farmers promptly through the Rural Free Delivery Service. This service is not now being used and never has been used for private interests, either directly or indirectly. It limits itself to the dissemination of established facts and of officially approved information. It has refrained from discussing individuals, from entering into controversies, and from commenting on legislation. It has the simple aim of attempting to convey to the farmers, through the press, as effectively and quickly as possible, the latest discoveries in agricultural science and the best practices.

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COOPERATIVE EXTENSION ACT.

But bulletins, circulars, and press notices conveying information for farmers, no matter how excellent they may be and how numerous, will not solve the problem of reaching the farmer and of inducing him to adopt the best methods. Personal contact in this field of education, as in others, is essential. The method of demonstration by competent individuals to farmers on their farms has been tested by the department over many years. It has been justified by its results and has been formally sanctioned by Congress in the recent Agricultural Extension Act. This measure is of vast significance. It is one of the most striking educational measures ever adopted by any Government. It recognizes a new class of students—a class composed of men and women working at their daily tasks on the farm. The Federal and State Governments take the adult farmer and farm woman, as well as the farm boy and the farm girl, as their pupils. The measure provides for cooperation between the States and the Federal Government. It guarantees a coordination of the forces of the two jurisdictions. It places the brains of the two great agencies in conjunction, eliminates waste and friction, and insures efficiency. Providing for an initial appropriation of $10,000 to each State, to be expended through the land-grant colleges in cooperation with the Federal Department of Agriculture, it stipulates that the amount shall increase by approximately a half million dollars from the Federal Treasury each year until 1921–22, and that each State accepting the act shall appropriate an amount equal to the increase above $10,000. The result will be that for the fiscal year 1922–23 and thereafter there will be expended, without any further legislation, from the Federal Treasury $4,580,000, and from the State treasuries $4,100,000, or a total of $8,680,000. This sum must be expended in direct instruction in the field, as

the act is very specific in prohibiting its use for teaching or erecting buildings at institutions and in limiting the proportion that can be expended in printing bulletins. If we add to this fund the direct appropriations to the department for educational extension work and the excess appropriations of the several States, it probably will be found that the nation will be expending in 1922–23 and thereafter, without any further legislation, a sum in excess of $10,000,000 or $11,000,000.

Every State in the Union through its proper authority has accepted the provisions of the act. Most of the colleges have already submitted their projects for the current year and are laying the foundations of machinery which will be adequate to the handling of this great task. This piece of legislation will do more than provide effective machinery for efficiently reaching the farmer. It will greatly improve the relations between the institutions of the several States and the Federal department. It will promote harmony between them and will lead to wiser planning of work.

Believing that the provision for the coordination of work under the extension act was wise, and realizing that it was desirable to have only one piece of machinery in each State undertake this sort of task, the department suggested to the several State establishments the advantage of coordinating with the work under the extension act the extension work for which the department is directly responsible through its special appropriations. This suggestion was received with favor by the State institutions, and in every State except two or three this further coordination has been brought about, and thus the two great agencies are working in each State in full accord and harmony for the interest of the whole people

FORESTRY PROBLEMS.

While the chief task of the department in forestry is the administration of the National Forests, its work has a larger aspect. Most of the country's timber is in private hands. Here the situation is far from satisfactory. Very little private timber is handled with a view to the production of a new crop. Lumbering now involves much waste, partly because of the limited market for the lower grades. In spite of the growing sentiment against forest fires, and the spread of organized fire protection, there is still a heavy fire loss. Altogether, our timber resources are undergoing both depletion and dissipation, notwithstanding the generally recognized need for conserving what we have and for producing a new crop. It is as much the duty of the department to seek means of success in the growing of this crop as of any other.

That forestry can be practiced in this country with good results the experience of the department in managing the National Forests makes clear. The main difficulty in the way of private forestry can no longer be held to be the lack of adequate knowledge or of successful example. Unquestionably the existing situation is brought about by various causes, some of which are due to unchangeable economic conditions, while others are probably removable. There is great need for a careful inquiry to ascertain just what and how important these various causes are. Such an inquiry has been inaugurated jointly by the Department of Agriculture and the Department of Commerce. Its purpose is to obtain the basis for a constructive public policy with regard to the timber question in all its phases—present conditions of production and marketing, the effects of timber speculation and the danger of private monopoly control, waste, the effects of competition, the various elements which enter into the cost of lumber to the consumer, and the question of future supplies.

An important part of the forest problem is to get the right line drawn between farm and forest. Under private ownership, considerations enter which do not always lead to the best use of the land. On the National Forests the question is determined by a careful study of what the land is best fitted to produce and what the public most needs. Agricultural development is provided for either by excluding from the forests land chiefly valuable for other than forest purposes or by listing land for settlement under the Forest Homestead Act. The work is carried out through land classification, which was aggressively pushed last year. The elimination made or determined upon totaled over 2,000,000 acres, while systematic classification was conducted on 100 of the forests and over 280,000 acres of land were listed for settlement under the Forest Homestead Law. The area in the forests at the close of the year, exclusive of land not the property of the Government, was slightly over 165,000,000 acres.

There is need for similar classification work outside of the National Forests wherever the public domain is timbered. There are still many areas which should be added to the forests. Wherever the land will have largest permanent value through use for forest production, it should be held in public ownership. Timbered portions of the public domain are now unprotected against fire and trespass and are often a source of danger to adjacent lands. Under existing law, the President has, in the seven States of California, Oregon, Washington, Idaho, Montana, Colorado, and Wyoming, no authority to add such lands to the present National Forests. Legislative provision should be made for applying the classification principles in these States.

There is also need for legislation to permit the consolidation of National Forest holdings through land exchanges with States and private owners. Some of the forests contain a great deal of land which was acquired from the Government

before the forests were established. Exchanges of land on the basis of equal values would be very advantageous to the Government, since the cost of administration and protection would be materially reduced.

The National Forests, of an immense property value, must first of all be safeguarded against destroying agencies. Their most serious menace is fire, though heavy losses may also result from the ravages of insect pests and tree diseases. The control of all these grows yearly more efficient. A most dangerous fire season has just been concluded with remarkable results. A drought of unusual severity and duration created tinderlike conditions throughout most of the Northwest. To this was added at times the peril of high winds, which greatly increased the difficulty of fire control. That the season was terminated without an appalling destruction of both public and private property in and about the National Forests is due to the preparedness of the Forest Service organization, the yearly expanding equipment of the forests with means of communication and movement of both men and supplies, and the aggressiveness with which the fires were fought before they had time to develop.

It is beyond question that the cost of discovering and fighting these fires was repaid many times over. A billion dollars' worth of Government timber—to say nothing of other resources, of private property, and of human life—was brought through the season with a comparatively trifling loss. To achieve this result it was necessary for the department to create a large deficiency, since the appropriation for emergency fire fighting was wholly inadequate. In consequence a deficiency appropriation must be asked from Congress.

A larger emergency fund is needed. In the summer of 1910 unprecedented fires resulted in a deficiency which Congress met by an appropriation of $900,000. To prevent such a contingency from arising the following year an

emergency fund of $1,000,000 was made available, to be drawn upon only in case of unusual need. This fund has been cut down in the successive appropriation acts since, until in the current year it has become only $100,000. Experience has made it plain that only in very favorable years is this amount adequate.

The administrative task which the National Forests present goes far beyond their protection. Use of their resources must be provided for under plans which aim at their systematic development.

Timber, forage, and water are the resources of primary importance. Their full development is possible only through accurate knowledge of the factors which control their yield and painstaking study of the methods which will secure the most complete use. Investigative work is the key which unlocks these resources for the public. Use of the National Forests is being developed along lines which are at once thoroughly scientific and thoroughly practical.

In its handling of timber sales on the National Forests the department is confronted with a situation radically different from that which obtains with respect to the grazing. While almost all the range on the forests is in demand, most of the timber is not. To a large extent, development work here means so handling the timber that it will be an important factor in opening up the country. Wherever and whenever general business and market conditions make it possible to sell large bodies of now inaccessible timber, the aim is to offer the timber on terms which will tend to increase transportation facilities, promote settlement, and build up permanent communities. Where timber can be sold, the benefits of Government management of the forests as public resources are apparent now. Where, however, the timber is not in present demand, a difficult situation sometimes exists.

It has been urged that, with the vast supplies of virgin National Forest timber, the Government should greatly increase its sales by lowering the price asked for stumpage. To the extent that such a course had any effect at all, it would be in the long run an effect unfavorable to the public interest. Upon the greater part of the timber it would have no effect, because no manufacturer could, under present conditions, afford to cut the timber at any price. Where timber is thus not in demand because still inaccessible, as a rule the possibility of marketing it depends on the advent of a period of greater activity in the general lumber trade. When, as at the present time, lumbermen are forced by general market conditions to curtail output, the department can not expect to make many large sales. Nevertheless, it is wise even in such times not to cease offering large bodies of timber on terms which may attract purchasers, and this is being done. At the same time all possible effort is given to develop small sales for the supply of local needs, and sales to industries which require wood for special purposes, since sales of this character provide a fairly steady market for National Forest stumpage, even when the general market is depressed. In a word, the timber-sale policy, no less than the grazing-regulation policy, aims to make the resource serviceable to the public now, as well as in the future, in the fullest degree which scientific production and utilization can make possible.

FURTHER SPECIAL COMMUNITY AID.

In regions where timber is the chief income-producing resource, absence of demand for it often works a serious hardship upon those who have entered the region as the advance guard of civilization and are seeking, in the face of many difficulties, to establish homes. There are counties in which a sparse local population of pioneer settlers find themselves surrounded by a wilderness largely consisting of

National Forest land, which is almost idle so far as any form of present use is concerned. In other words, a great, if not the greatest, potential source of wealth in such counties, held in trust by the Government for the benefit of the public, not merely contributes nothing now to the upbuilding of the communities which will give value to the forests, but actually adds to the burden which these communities must assume. Were the forests private property they would pay their fair proportion of the cost of road development, public schools, and other public activities, through taxation. The Government, unlike the private owner of timberland in such regions, is holding the timber, not in order to make a profit later by its advance in value, but in order to make it promote the public welfare. That it should be made to serve the local as well as the national public welfare has been definitely recognized in the provisions of law for the use of 35 per cent of all gross receipts from the forests for local public purposes.

To carry more fully into effect this already established principle a further step should be taken. It should not be necessary to wait until the period of hardest struggle is past before these public resources begin to assist local development. Before the National Forests begin to yield large incomes, as well as after, they should be made to participate in the work of building up the country and giving value to all its resources.

The first need of the public in undeveloped regions is for more and better roads. Without them the struggle of individuals to gain a foothold is much more difficult, while isolation from neighbors and the outside world means meager educational opportunity, a lack of comforts, and conditions unfavorable to community life. A road system, however, constitutes a capital investment which a handful of settlers must make a little at a time. When their roads must be built largely through National Forest lands, which

pay no taxes, their case is much more difficult. In such regions the Secretary of Agriculture should be authorized to make a study of the local conditions and to gather all the data necessary to formulate a plan for public-road development based on local needs. These plans should be carried into sufficient detail to provide a reasonably accurate estimate of the cost of the road construction which it is proposed that the Government shall undertake. They should be accompanied by careful and conservative appraisals of the value of the National Forest timber in each locality and a forecast of the future income which the forests will bring in from all sources. On the basis of the showings of fact regarding the value of the Government's property, its potential income-yielding capacity, and the needs of the public, Congress should be asked to appropriate for the construction of specific projects recommended by the Secretary of Agriculture. The cost of such road construction by the Government should constitute an advance of the amounts which the forests would later make available for local use. In effect, therefore, the roads would become an obligation upon the forests, to be extinguished as their resources come into commercial demand.

Water is a National Forest resource of even greater importance than timber or range, for the forests feed every important western stream. Water supplies and the value of water use depend to a large extent on the methods employed in handling the timber and forage resources, for both the volume and the purity of the water yield may be disastrously impaired by bad forestry or grazing methods. Of all forms of water use, that which supplies municipal needs should be given most careful consideration. Some 1,200 western towns derive their water from National Forest watersheds. The authority of the Secretary of Agriculture to protect such water from contamination is inadequate to safeguard the public health, and should be enlarged by

Recreational use of the forests is by far the chief of what may be called their secondary uses, and is certain to grow rapidly in importance. While water, wood, and forage production must be given first place, constructive study of the problems which the value of the forests for recreational use present is also an urgent need. Among these problems is provision for the use of land by persons wishing to build summer homes within the forests, and by hotel enterprises. At present the only course open to the department is to grant applicants for such privileges a revocable permit to occupy the necessary land. Provision for term leases is highly desirable, and legislation to this end is urged.

REORGANIZATION.

The Congress at its last session authorized and directed the Secretary of Agriculture "to prepare a plan for reorganizing, redirecting, and systematizing the work of the Department of Agriculture as the interests of economical and efficient administration may require." It ordered that such plan be submitted to Congress in the Book of Estimates for the fiscal year 1916, and that the estimates of expenditures of the department for the fiscal year 1916 shall be prepared and submitted in accordance therewith. In compliance with this authorization and direction, a careful survey has been made of the organization and work of the entire department. It was evident from the outset that in the rapid growth of the department some lines of work had been located illogically in different bureaus out of immediate touch with closer related lines and, in some instances, without any reference to the adequacy of the machinery of the bureau to handle them. Furthermore, it was apparent that the three leading lines of department work—the regulatory, the research, and the educational—had become in a measure intermingled in the various bureaus, so that no satisfactorily clear view could be had of them in their entirety either in any bureau or in the department as a whole. It was obvious that some

work was done at cross purposes and that a certain amount of conflict of interest, lost motion, and inefficiency resulted. It is clearly desirable, as far as possible, to differentiate and segregate each kind of work from the other, to see to it that the policing or regulatory functions do not interfere with the research work, or either of these with the educational or extension work, but that, on the other hand, they are so organized and related that each would reenforce and foster the other. A committee consisting of officers drawn from various bureaus made a careful study of the situation and submitted its report, which, after revision, was approved by the Secretary and will be reported to the Congress for its sanction. The estimates of the department have been submitted in accordance with the plan, as directed by the Congress.

The first important feature of the proposed change is the definite outline or segregation in each bureau of these three groups of activities—the regulatory, the research, and the extension. The conclusion was reached that it was not only not necessary to interfere with the bureau and office organizations existing, but that it would be distinctly unwise to do so. The suggestion of grouping the services of the department as a whole, according to the purposes in view, into regulatory, research, extension, and other groups, each with a large number of similar small units, was carefully considered and was abandoned as unnecessary and undesirable. It was decided that better results would be secured by retaining the existing organizations, with certain modifications and rearrangements.

This segregation, however, which is highly important, is a matter of internal concern and in the interests of administrative efficiency, and requires no legislative action. The work will be shaped in conformity to the segregation, and the administrative officers will have a clearer view of the several activities under their direction. Pains will be taken to assign those who have research talent to the investiga-

tional work, those who have administrative ability to the regulatory, and those who have special talent for the direction of extension work to that entirely. The changes in these directions can not fail to be conducive to efficiency.

The second and equally important suggested change is the relocation of important lines of work, as follows:

It is proposed to remove from the Bureau of Plant Industry the Office of Farm Management and the farm-demonstration work for both the North and the South, and to attach the former to the Office of the Secretary and the latter to the Office of Experiment Stations, the name of which it is proposed to change to the States Relations Service. Farm Management conceives the farm as a whole. Its problem is not primarily a Plant Industry problem. It is rather a business or economic problem. It is not one for which the agronomist has necessarily the requisite training, although the service of the agronomist as well as the services of experts of other bureaus are invoked. Since its function is that of studying the farm from the business point of view in all its aspects, it seemed advisable to relate the office to that of the Secretary, so that the officers might feel conscious of no bureau limitations. Similar considerations led to the conclusion that the farm-demonstration work should not be attached to a particular bureau. Heretofore the agents in this work, attached as they have been to the Bureau of Plant Industry, have experienced some embarrassment in demonstrating things coming within the work of other bureaus. Obviously the farm demonstrator must be prepared to demonstrate anything the department has of value to the farmer. He can not conceive of the farm partially. The change in the name of the Office of Experiment Stations to States Relations Service is proposed because the term "Office of Experiment Stations" is no longer indicative of that part of the department's activities. That office has in addition to the supervision of the experiment-station funds the supervision of other funds expended by the land-grant

colleges, and has logically been charged with the administration of the new extension act. The direct farm-demonstration work is similar to the work which will be carried on under the extension act, and, as has been stated, arrangements have been made for coordinating it with the work under the extension act.

It is proposed to change the name of the Office of Public Roads to the Office of Public Roads and Rural Engineering, to eliminate from the Office of Experiment Stations the work in irrigation and drainage, and from the Bureau of Plant Industry the work in rural architecture, and to locate these three lines of work in the newly named office. There seems not to have been any logical reason for locating the work in irrigation and drainage in the Office of Experiment Stations, and that office in its higher administrative branches is not organized with a view to the direction of engineering work. The Office of Public Roads is primarily an engineering office, and irrigation and drainage, as well as architecture, naturally belong to it. To the new Office of Markets and Rural Organization it is proposed to transfer from the Bureau of Plant Industry the work in farm-credit and farm-insurance investigation; from the Bureau of Animal Industry the market-milk investigations, and, in part, in cooperation with the Bureau of Animal Industry and Bureau of Chemistry, the poultry and egg investigations.

It is proposed to transfer from the Bureau of Soils to the Bureau of Plant Industry the soil-fertility investigations. The committee of experts reporting on this matter were unanimous that the work in soil-fertility investigations and that in soil bacteriology and in plant pathology in the Bureau of Plant Industry should be located in the same bureau. They are closely related, and work in one could not in all cases be carried to a satisfactory conclusion without a close and intimate coordination with the others. After a most careful consideration it seemed wise and practicable to pre-

pose that the transfer be made to the Bureau of Plant Industry. Other less important changes include the transfer of poisonous-plant investigations from the Bureau of Plant Industry to the Bureau of Animal Industry, investigations of duck diseases from the Biological Survey to the Bureau of Animal Industry, and of wood-distillation work from the Bureau of Chemistry to the Forest Service.

There is good reason for believing that the redirection and relocation of the work as proposed will result in a marked increase in the efficiency of the labors of the department.

CONCLUSION.

I have sought to bring into view in the main some of the larger constructive tasks and proposals of this department. I have not undertaken to review the work and services of certain great offices of the department, such as the Weather Bureau, which is giving highly valuable aid not only to the farmer, to the business man, and to the navigator, but to all the people of the nation; the Office of Experiment Stations, which has such broad and intimate relations with the whole land-grant educational machinery of the nation; the Bureau of Chemistry, which is charged with the administration of the Food and Drugs Act; the Bureau of Biological Survey, which is intrusted with many difficult tasks, including the administration of the Migratory-Bird Law; the Bureau of Soils; the special boards, such as the Federal Horticultural Board and the Insecticide and Fungicide Board; and the Office of the Solicitor, whose activities are essential to the orderly handling of many important departmental, legislative, and administrative affairs. I have not attempted to outline the activities of divisions of these or of other offices and bureaus. I should deeply regret it if my failure to do so were interpreted to indicate that their work is in any measure less valuable and helpful than that which has received more specific and elaborate mention. Where activities are so varied, the task must of necessity be one of selection and

emphasis. For a full comprehension of the undertakings, activities, and services of the department the reports of the several bureaus and offices separately published must be consulted.

Through such legislation, enterprises, and labors the Federal Government is attempting to solve the problems of agriculture and of rural life. It finds valuable allies and co-workers in the great agricultural agencies of the several States. Nothing short of a comprehensive attempt to make rural life profitable, healthful, comfortable, and attractive will solve the problems. It is the only sure way of retaining in the rural districts an adequate number of efficient and contented people. That the thought and effort of the nation must be persistently and systematically along these lines is clear. The urgency of the task is emphasized by the fact that while the population of the United States in the last 15 years has increased 23,000,000, the strictly rural districts have shown an increase of perhaps less than 6,000,000. While we labor to increase the supply of material things we can not neglect the higher things—the intellectual and social sides of rural life. The conservation and development of the people is the greatest problem of conservation confronting us. We must see to it that some of the finer results of civilization accrue to the people of the rural districts and are not the peculiar possession of urban communities. An expenditure of effort and money in this direction can not be a burden. Through such measures wisely executed and with such protection rural life will become more efficient, and the farmers of the nation may without fear face the competition of the world.

Respectfully,

D. F. HOUSTON,
Secretary of Agriculture.

WASHINGTON, D. C., *November 14, 1914.*

THE NATIONAL FORESTS AND THE FARMER.

By Henry S. Graves,
Forester and Chief of the Forest Service.

A FEW years ago more than a hundred farmers in the Kootenai Valley, in Montana, petitioned against the proposed elimination of their section from the Kootenai National Forest. They wanted it to remain where it was. Its elimination they knew, from the history of adjacent land outside the Forest, would mean that it would at once be taken up by timber speculators and lumber companies, to be held for years without development. They knew also that if this came about neighbors could not be secured nor roads and schools be developed in the county anything like as rapidly as if the land remained in the Forest, where those portions better suited for agriculture than for forest purposes could be entered by permanent settlers under the forest homestead act.

In 1911 an association of farmers in Colorado, who draw upon the North Platte River for water to irrigate their farms, sent an urgent request to the Government to restrict timber cutting on the North Platte watershed, so that as far as possible high spring freshets might be prevented and more water furnished during the summer months, when their crops were most in need of it. They relied upon the National Forest which included that watershed to insure them a steady flow of water in the stream, on which their crops depended.

These two instances, taken at random from a great number of similar ones, indicate the interest which farmers take both in the existence of the National Forests and in the way they are administered. This interest does not belong only to farmers in and near the Forests; it belongs to farmers everywhere. The examples cited illustrate but two of the many ways in which the National Forests influence the welfare and development of agricultural communities, an influence which extends far beyond the Forest boundaries. For one thing, the National Forests are the American farmer's most valuable source of wood, the chief building

material for rural purposes. For another, they are his most valuable source of water, both for irrigation, as just indicated, and also for domestic use. Scarcely less important, they afford him a protected range for his stock; they are his best insurance against damage by floods to his fields, his buildings, his bridges, and his roads, and against decreasing soil fertility.

Geographically, the National Forests cover a wide area. They comprise the higher portions of the Rocky Mountain Ranges, the Cascades, the Pacific Coast Ranges, a portion of the forested coast of Alaska, some of the mountain and hilly regions in eastern Montana and in the Dakotas, Oklahoma, and Arkansas, and limited areas in Minnesota, Michigan, and Florida. Besides these, land is now being purchased for National Forests in the White Mountains of New Hampshire and in the Southern Appalachians. In regions so vast and widely scattered the conditions of agriculture, and forest conditions too, necessarily vary in a great degree, which brings about corresponding differences in the way the National Forests affect agricultural interests and the extent of their influence. But wherever agriculture can be practiced the farmer is benefited by the existence of National Forests and their proper handling.

Experience has amply proved that in regions where timber is the most important natural resource permanent forests managed with a view to sustained timber production are not only beneficial to the farmer but absolutely essential to the continuance of agriculture. If the timber is exploited without thought of the future, lumbering presently comes to an end. The result is that the local market for farm products furnished by the presence of lumbering operations is withdrawn. Forest fires ravage the cut-over lands and in the end destroy all prospects for further lumbering. What should be productive timberland is converted into a waste. From such a region the farmers who may have established themselves on scattered areas of land suitable for agriculture move out. In some parts of Europe it has been found necessary, as a preventive of distress to the agricultural population and of abandonment of farm lands, to modify the cutting plans laid down for the forests in order to provide for greater continuity of operations. There

are parts of the United States in which cultivation of the soil has ended with the local lumbering, or shortly afterwards. The farmers have found that without the market for their meats, vegetables, hay, and grain which the lumbermen supplied they can not make a living. There are other regions where the stability of the agricultural industry is absolutely bound up with forest protection. This is strikingly true in parts of the Appalachian Mountains. It is no less true in many of the National Forest regions in the West.

FARMS IN THE NATIONAL FORESTS.

In general, the National Forests occupy the higher and more rugged portions of the mountains, at elevations above the main agricultural zone. Their permanent boundaries are drawn in such a way as to exclude all large bodies of agricultural land; the lands included in the National Forests are those chiefly valuable for forest purposes. In many instances, however, there are within the Forest boundaries scattered patches and strips of land of agricultural character, but too small to be eliminated from the Forest by themselves. These lands occur along some of the valley bottoms, at the confluence of streams, and on narrow benches. Whenever such tracts are suitable for the development of agricultural homes they are opened to entry. Thus the establishment of a National Forest does not mean that agriculture within its boundaries is prohibited. On the contrary, the Department of Agriculture is classifying the lands in the Forests in order to search out the agricultural areas and to bring about their development as fast as possible. To show how the classification of forest and agricultural lands works out in putting every acre or parcel of land within the National Forests to its best use, the Kootenai Valley may be taken as an example. Here a large river winds for 150 miles through a National Forest. It is distinctly a mountain stream. At many points steep, densely wooded hills drop down to the water's edge, making the valley a gorge or canyon. Where tributary streams join the main river, narrow V-shaped valleys run up them for short distances, narrowing in width as the mountains close in. Here and there bars in the river have resulted in a deposit of silt to form long and narrow fertile bottoms, or

level silt islands have been thrown up in the stream itself. Part way up on the mountain slopes occasional level benches afford a few acres or a farm or two of fertile land. At first it was proposed to throw out the entire valley, a strip 3 miles in width on either side of the river. Ninety-five per cent of this belt, however, is nonagricultural land, whose cultivation should not be attempted. It can be of most use to the local community, as well as to the country at large, by growing timber. So instead of throwing the whole valley out of the National Forest, the Forest Service has painstakingly surveyed every little river bottom, island, or bench which contains enough arable land to support a home. Many of these patches are small, but their soil is so fertile that a home can be maintained upon them by intensive truck or orchard farming. Much of the valley is not yet covered by the rectangular system of public land surveys, and instead of waiting for them the Forest Service has, by metes and bounds, run out the boundaries of each of these farmsteads, segregating them from the Forest and making them available for settlers. In this fashion more than 300 farms have been carved out of the Kootenai Valley. The rest of the land has been kept under Government control for continuous forest production, the economic function which it should fulfill.

Another illustration might be cited from Fortine Creek, in the western portion of the Blackfeet National Forest, in northern Montana. Here conditions are somewhat different from those in the Kootenai Valley. Two high, rugged mountain ranges, one on the north along the Canadian border and one on the south, form a divide from the Flathead drainage. Between them lies a broad, level valley, not unlike many of the lower valleys in the Allegheny region. In places it is 3 miles or more in width, offering almost unbroken stretches of arable land. Here and there along its edges spurs jut out from the mountains, forming an irregular boundary with little fingers of cultivable land running up the channels of many of the small mountain streams. The problem here is not alone to determine the most valuable use for each acre of land. Outlets must be retained for the large bodies of timber back in the mountains, and mill sites for manufacturing this timber must be available. In a word, a practical boundary line must be fixed which will set off the

forest areas, together with the necessary facilities for utilization, from the arable lands to be turned over to the farmer. This is precisely what the Forest Service is doing, and in this way the greatest permanent usefulness of each resource as an economic asset of the country is secured.

The fact that a farm is within the boundary of a Forest does not operate to hinder the owner in developing his property. Actually he receives many direct benefits and privileges from the fact that his farm is there. In some places farm values are higher because the land is in a Forest. Settlers are seeking such farms in order to get the advantages of protection of stock and other privileges, and it is very common, as cited at the beginning of this article, for farming communities inside the Forests to protest against proposed eliminations that would put them outside the boundaries.

Many thousands of farms are now being developed within the boundaries of the Forests. This does not include those occupying the wider valleys which extend into the Forests and which have been segregated by elimination, but only the individual farms and small groups which could not in practice be eliminated without including large areas of nonagricultural timberland. During the last decade the Forest Service has classified as agricultural and opened to entry over 15,500 individual scattered tracts in the Forests, covering over 1,700,000 acres. The classification has resulted further in lessening the area held in the Forests by over 9,000,000 acres, through eliminations, which enable the unappropriated and unreserved agricultural land to be taken up under the general homestead laws. Within the last two years there has been eliminated in large blocks 2,650,426 acres. Not all of this land was agricultural, but these areas and the 1,763,867 acres under consideration for elimination contain the bulk of the agricultural lands originally included in the Forests. The remaining agricultural land is chiefly confined to isolated tracts scattered here and there; to restricted areas requiring irrigation, but where water can not be developed; and to certain river bottoms and benches which are now covered with very heavy and valuable timber.

The scattered patches and strips of agricultural land will be opened to entry as fast as classified. The best of such tracts have in most cases been taken up. What remain are

as a rule not only isolated, but so high up that the seasons are short and farming is not as good as upon hundreds of thousands of acres of vacant land on the public domain outside the Forests. Where the area is too small to constitute a practical farm unit, the small cultivable strips or patches are not opened for homesteading but are retained for forest purposes. A real injury is done the homeseeker who is induced to settle upon a tract of land so small and unproductive that his only escape from poverty is to abandon it. That very land, however, may be valuable for forest purposes, and an attempt to use it as a farm is an economic error for the reason that existing wealth is destroyed and no new wealth created. The aim in administering the National Forests is to establish permanent farm homes and communities of homes. Where the land can not be developed for agriculture but can be used for timber development or some other industrial purpose, it should be devoted to what will bring the greatest service to the localities and the country as a whole.

There is also a certain amount of land in the Forests which ultimately can be farmed, but which at the present time is covered with very heavy timber. A constant pressure is brought on the Government by private individuals who want to acquire possession of these lands primarily for their timber value. Single tracts of 160 acres often have a value for the timber alone of $20,000. So it is inevitable that here and there individuals are willing to use almost any means to get possession of such a timber stake for nothing or next to nothing. But in spite of the fact that some of these lands have soil of an agricultural character, to throw them open for homestead purposes would not result in farm development. This has been proved over and over again where lands acquired in this way under the guise of the homestead law are to-day in the hands of lumber companies who promptly purchased them from the settlers as soon as title passed, and are either reserving them for later cutting or are holding the land itself after cutting for from $40 to $60 an acre, or even more—a speculative process which effectively prevents the possibility of men of small means acquiring and establishing homes there.

Thus agricultural development is retarded by the speculator capitalizing the unearned increment and passing it on

as a perpetual burden on the land. Removing the timber through its sale by the Government before the land is opened to settlement removes the speculator and makes it reasonably certain that the land will be taken by a permanent settler and that the unearned increment will go into clearing and productive farm development.

It is not meant to imply, of course, that most applicants for a timbered tract fail to show good faith. Without question, many really desire the land primarily for the agricultural value, and start with the idea of clearing it, even if the timber has to be cut and burned. The fact remains, however, that in most cases the settler sells out and goes elsewhere. When it costs from $100 to $250 per acre to clear land and requires a long time and the most arduous effort to get a tract under cultivation, while it is possible to sell that same tract for its timber at from $2,000 to $10,000, or even more, the average settler prefers to realize on the timber and move to another place where the difficulties of farming are less severe.

The Government is withholding from agricultural entry such heavily timbered land until after the timber is cut off. But as soon as this is done the land is opened to entry and settlers acquire it directly from the Government for free homesteading, instead of having to pay from $40 to $60 an acre to speculative holders. This procedure is being successfully carried out in many places to-day. For example, in the Kaniksu National Forest, in Idaho and Washington, timber sales have been made to include much of the remaining agricultural timbered land. Within eight years fully 10,000 acres of land will be made available for settlement. Permanent homes will be established and there will be available for the use of the communities approximately $225,000 for roads and schools, their share of the proceeds from the sale of the timber. In the Kootenai Forest, in Montana, the Government is disposing of the timber in a way to open up the remaining acres of agricultural land in the Kootenai Valley lying within the Forest. Directly adjacent to this Government land are thousands of acres of timbered lands taken up under the homestead law before the Forests were established, and now held by timbermen and speculators without development of any kind. It is private ownership

of heavily timbered agricultural land that blocks farming development; Government ownership insures such development under conditions that give opportunities to the small settler whose only capital is his strength and courageous perseverance.

There are still some lands in the Forests which have soil suitable for cultivation if water were available for irrigation. Where water can be secured such land is promptly opened to entry. In case water can not be developed the land is retained in the Forest and used for tree growth and grazing.

One of the most serious agricultural problems of the Northwest to-day is the development of the logged-off lands in private ownership. In Oregon and Washington alone over 3,000,000 acres of such logged-off lands are lying idle, though much of the area has fine agricultural soil and a climate to insure abundant crops and the development of thriving farming communities. Yet in this same region hundreds of settlers are seeking to find some place in the National Forests, usually remote from transportation, high in the mountains, where the climate is harsh and soil relatively inferior, because the good lands at lower elevations outside the Forests are held at prohibitive prices. The real solution of the problem of agriculture in such sections is to develop the rich logged-off private lands that lie outside the Forests and are now idle and unproductive, not to throw open the nonagricultural Forest lands as some are urging.

SPECIAL BENEFITS TO THE FARMER.

Specifically, the benefits to the farmer from the existence of National Forests may be discussed under the following heads:

(*a*) The benefits through protection of water resources.

(*b*) The benefits through supplies of Forest products.

(*c*) The benefits from grazing privileges.

(*d*) The benefits, direct and indirect, from the establishment and maintenance of various industries utilizing the resources of the Forests.

(*e*) The benefits from public improvements built by the Government.

FIG. 1.—A FARM IN THE IDAHO NATIONAL FOREST, TAKEN UP UNDER THE ACT OF JUNE 11, 1906.

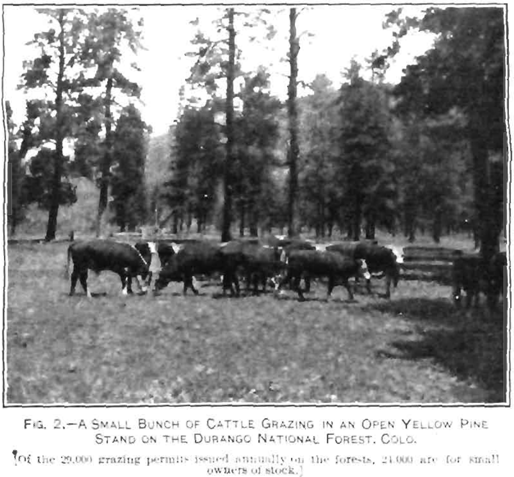
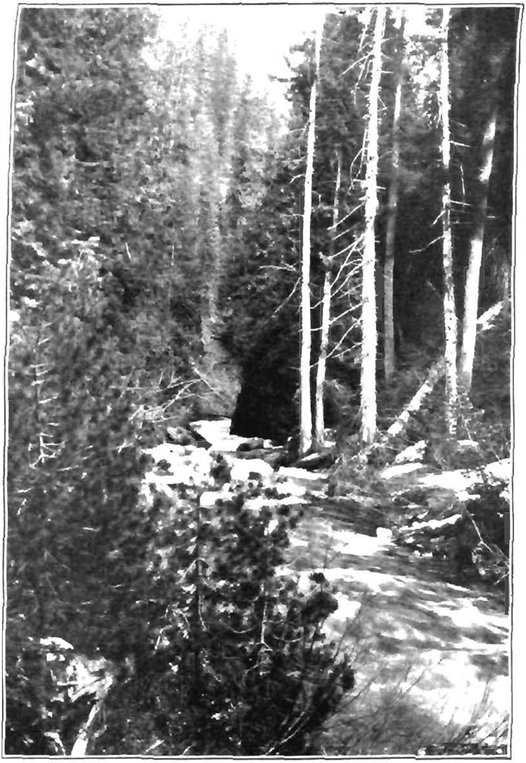


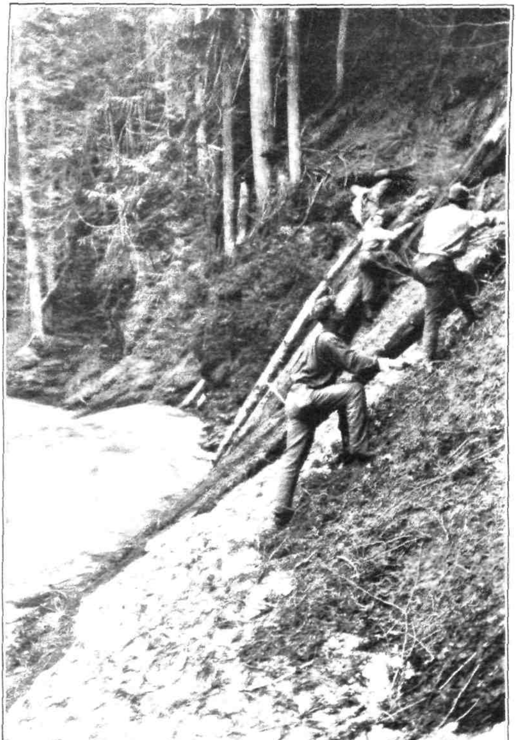
FIG. 2.—A SMALL BUNCH OF CATTLE GRAZING IN AN OPEN YELLOW PINE STAND ON THE DURANGO NATIONAL FOREST, COLO.

[Of the 29,000 grazing permits issued annually on the forests, 21,000 are for small owners of stock.]



AN "AGRICULTURAL" CLAIM ON THE ST. JOE NATIONAL FOREST.

[The 60° slopes rise directly from the creek. There is practically no level land on this claim, but the white pine timber is valued at $20,000.]



ANOTHER "AGRICULTURAL" CLAIM ON THE ST. JOE NATIONAL FOREST.

[The ground is so steep that both hands have to be used to keep from sliding off into the creek. The photograph was taken on May 22, but snow was still on the ground. The applicant claimed that this was excellent wheat land.]

FIG. 1.—IMPORTANT IRRIGATING DITCH AND LATERAL LESS THAN ONE MILE FROM BUSINESS SECTION OF EPHRAIM CITY, UTAH, BADLY DAMAGED BY THE FLOOD OF AUGUST 24, 1912.

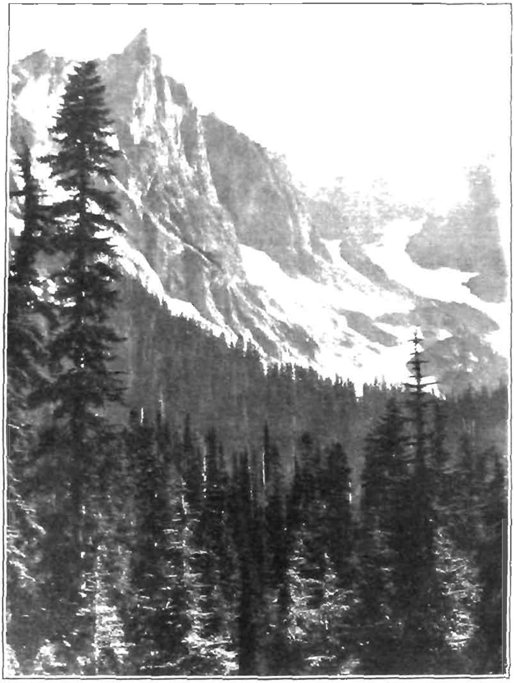
[The flood overflowed the cribbing above man on left, lowered the creek bed 5 feet, and washed out the headgate.]

FIG. 2.—A STREAM IN A NATIONAL FOREST WHOSE HEADWATERS ARE PROTECTED.

[[illegible] River, Siskiyou National Forest, Oreg.]

PLATE V.

A SMALL TIMBER SALE AREA IN AN ENGELMANN SPRUCE STAND ON THE MADISON NATIONAL FOREST, MONT.



A REGION FOR THE MOUNTAIN CLIMBER, CAMPER, AND SPORTSMAN.

[In the Cascades, Snoqualmie National Forest, Wash., sometimes called the "Alps of the United States." The mountains here are very high and rugged, with peaks rising over 11,000 feet. The great Douglas fir stands on the west slopes are the most heavily timbered forests in the country.]

WATER RESOURCES.

One of the purposes underlying the establishment and maintenance of the National Forests is the protection of the sources of water supply. By their situation in the mountains the Forests cover the higher and more rugged portions of the watersheds at the headwaters of various rivers and streams. The protective influence of the forest cover on sources of water supply is of importance to all industries using water from the streams rising in the National Forests. It is of special importance to the agricultural interests. In many parts of the West the water used in irrigation is derived almost entirely from streams which have their source in the National Forests. This is true of the majority of the great reclamation projects of the Government, which furnish water for many hundreds of thousands of acres of land. Every farmer who uses this water is, in a measure, directly dependent in the long run on the proper handling of these National Forests. In several instances National Forests are maintained primarily for the purpose of watershed protection. The headwaters of the Salt and Verde Rivers in Arizona, on which is one of the greatest of the Federal reclamation projects, are comprised in the Tonto and Prescott National Forests. Considerable portions of these watersheds are administered as National Forests in order to control the grazing and so to prevent erosion. Every water user on this project realizes that overgrazing of the watershed would greatly hasten the silting up of the reservoirs and canals.

On many National Forests in the Rocky Mountains and elsewhere, protection belts of forest have been established on the upper sources of important streams. In these belts all cutting will be very carefully regulated, so as to run no risk of disturbing the forest cover, which exerts a beneficial influence in holding snow and storing water during the period of heavy precipitation. Often no cutting at all is permitted, except of dead timber. In the steep mountain ranges of southern California the use of the pine forests high up on the watersheds is absolutely controlled by the necessity for conserving the water needed to irrigate the citrus-fruit farms in the valleys below. Except where it is very clear that

heavier logging will have no harmful effects upon stream flow, cutting is confined to the removal of an occasional overmature tree whose usefulness as a conserver of water is practically gone. Often Forest officers cooperate with local water users in studying conditions of stream flow and determining how they should affect the management of the Forests. In Colorado committees representing irrigation associations have been conducted over timber sales on watersheds in National Forests, the methods of cutting explained to them, and conferences held to determine how far the Government may safely go in utilizing the timber. All told, the value of the farms whose water supply for irrigation is protected by the National Forests will run into the hundreds of millions of dollars.

Farmers and other water users are very jealous of the way in which the Forests are handled. On the Angeles Forest alone local citizens contribute over $15,000 a year to aid in building fire lines for the prevention of disastrous forest and brush fires. Such men see in the right handling of the Forest the source of their own prosperity, and they cooperate in every way they can to aid the Government in its forest work.

A second way in which farmers are affected by the National Forests is in the use of water for domestic purposes. Not only do individual farmers get the water used in their homes and for their stock from streams rising in the Forests, but many small towns and communities are thus supplied. Altogether about 1,200 towns and cities depend on National Forest water. With the increased development of the country which is following the utilization of the National Forest resources, the number of communities dependent on water from the Forests is increasing, and constantly larger quantities are used in each locality. In the planting operations on the National Forests special attention is given to watersheds which supply municipalities and rural communities. From 10,000,000 to 15,000,000 little pines, firs, and spruces are planted every year in the Forests, and some tons of tree seed sown. Not only is the forest cover on these watersheds being extended by the Government with the aid of local citizens, but special arrangements are made for controlling grazing and other uses of the area in order to prevent the silting of the stream or pollution of its water.

One of the greatest handicaps which the Forest Service has already encountered in meeting this problem of guaranteeing pure water for domestic use is the fact that certain portions of the watersheds have already been privately acquired and the control thus passed from public to private hands. Every year petitions are received for additions to the National Forests, in order to include under the protective system some town or community watershed.

SOIL WASHING AND FLOODS.

Of no less importance to the farmer and the community is the need for having the water supply under constant control and free from torrents which carry away diversion dams, headgates, bridges, and roads, and leave irrigation ditches, fields, and streets strewn with bowlders and mud. Such floods are a matter of disastrous experience in a number of mountain valleys where successful agriculture depends upon unfailing streams. In the San Pete and Castle Valleys of Utah alone the damage to cultivated fields, irrigation works, roads, water-supply systems, and power systems, as the result of erosion and floods since 1890, may be conservatively estimated as totaling in six figures.

When these valleys were settled the streams flowing into them were clear even during the high-water season. As settlement grew the increasing number of cattle and sheep were forced back to the headwaters of the streams for summer pasturage and the timber for domestic supply was cut where it could be secured most conveniently without thought of future protection. The herbaceous and shrub vegetation on the high untimbered slopes, which formerly broke the force of the rain, bound the soil together in its resistance to the combined force of water and gravity, and kept it sponge-like through the constant addition of vegetable matter, was reduced or destroyed by overstocking and premature grazing with cattle and sheep. At the same time the originally mellow soil became packed beneath, and a dust bed on top. The transformation brought about a change similar to the difference between a cultivated field and an adjoining barnyard, the former highly receptive to falling rain, the latter almost impervious. Small gullies soon formed; these increased in number and size, widening out into fan-shaped

drainage at the headwaters of streams and collecting as a funnel in the canyon below. The character of the run-off under such conditions of the watershed is illustrated by an observation in the San Pete Mountains of Utah. At 11 a. m., July 30, 1912, a light rain started; at 11.45 a. m., the roar of a flood was heard at the head of a small canyon draining approximately 1,500 acres of sparsely timbered land at 10,000 feet elevation, lying fan-shape at the head of the canyon. The natural stream, a mere driblet, was increased to a maximum front 25 feet wide and 8 feet high. The main flow lasted approximately an hour and in this time changed its course at the mouth three times. A solid section of bank approximating 5,000 cubic feet was torn out in a few minutes. It is estimated that 30,000 cubic feet of gravel and bowlders came down in this flood resulting from 0.5 inch of rain in 2 hours over a drainage area of 1,500 acres which was hard packed and gullied.

A flood of this character originating at the headwaters of a single canyon on August 24, 1913, carried bowlders as large as 10 cubic feet to the settlement beyond the canyon; head-gates were washed out and the main ditch was lowered at one point 5 feet below the intake of laterals, and at another point the channel was filled up and changed. Basements, sidewalks, lawns, and corrals were left under a sheet of mud; the city light plant and the water system were temporarily impaired, and 7 miles of a much-used timber wagon road was made impassable.

To eliminate such floods it is essential to eliminate the conditions which give rise to them. With the watersheds under protection, grazing is adjusted to give nature a chance to revegitate the untimbered slopes; timber cutting is so planned as to protect areas of critical position against erosion and floods; and investigations are under way to develop feasible methods of repairing damage where erosion has progressed to a degree beyond repair by nature alone. By proper management it is believed that this repair work can be done in time without interfering materially with the farmers' need for timber and range. The Government is thus working to protect the farms from disasters that in a few hours might wipe out the results of many years' hard work.

Fully as important, but less noticeable, is the protection afforded both local and general soil fertility by the National Forests on our principal mountain ranges. The pioneer found rich soil on both hillside and plain; but experience has taught him, and the soil expert has demonstrated, that while the fertility of the valley is permanent, the fertility of the hillside is transitory. The humus produced by forest growth makes an exceedingly rich soil, but rainfall and gravitation constantly tend to carry that fertility to lower lands. So long as the slopes are well protected by tree growth, they continue to add to the fertility of the valley lands. Each year a ton or more of litter is added to each acre of forest soil in a dense forest, but the soil fertility remains practically constant, the increase being slowly contributed to lower lands through the forces of nature. The hillside lands are slowly lowered, while those of the valley are raised. So long as this continues at an imperceptible rate the valley is benefitted, while the hills are not injured. An analysis of Illinois soils showed that on hill land the surface 7 inches of soil contained an average of 2,000 pounds of nitrogen, while the next 7 inches contained only one-third as much, and the next still less. At the same time the valley land contained in many instances three times as much, and was fairly uniform to a considerable depth. Under normal forest conditions *the more valuable elements are slowly transported from forest to field. Cut off the forest, and the hillsides become* a source of sterility instead of fertility. The unregulated rush of waters carries sand and gravel instead of valuable plant food down into the field, destroying the soil fertility of both hillside and valley. This wholesale soil waste and destruction is prevented by the regulated cutting of timber and restricted grazing in the National Forests. The continuation of this protection is all that stands as a safeguard against great injury to the soil fertility of millions of acres of very valuable and productive farm land.

PROPER CONTROL OF TIMBER RESOURCES.

One of the immediate benefits to the farmer comes through the public control of the timber resources. In the first place, settlers who live in and adjacent to the Forests are granted free use of firewood and certain other material for

domestic purposes, and through a recent enactment of Congress there is now authority for such settlers to secure larger amounts of timber needed on their farms merely by paying the Government what it actually costs to administer the sale. This ordinarily is from 50 to 75 cents per thousand feet, which means an actual saving in money to the farmer of from 50 cents to $5 per thousand, according to the class of timber. In administering the National Forests, provision is made first of all for the needs of the farmers and other local residents. There is thus a guarantee of a permanent supply of material for local communities. The importance of this is illustrated in those regions where the National Forests constitute practically the only source of wood and timber. In certain places in the Southwest and in other places east of the Rocky Mountains, farmers sometimes travel 100 miles to a National Forest to obtain firewood.

Many National Forests in sparsely timbered regions serve as community woodlots for the farmers surrounding them. Instead of cutting material for fuel and farm improvements from the woods on his place, like the average farmer east of the Mississippi, the ranchers turn to these public woodlots. The Sioux National Forest, on the Dakota-Montana line, supplies from 1,200 to 1,500 farmers. The Wichita National Forest, in western Oklahoma, furnishes material to between 1,400 and 1,500 more, and the Cache and Minidoka National Forests, in southern Idaho, together each year furnish farm materials to 3,400 permittees. This use covers every conceivable requirement of the farm—cordwood, fence posts, derrick poles for stacking hay, corral poles and barn rafters, and lumber for buildings. Where timber is particularly scarce these forest woodlots are reserved entirely for the needs of localities surrounding them, including mining industries, where they occur, and local towns as well as rural farm communities. Sales of timber for shipment to outside regions are only permitted where there is clearly more timber than local users require.

Often the community feature of a National Forest is further emphasized by cooperative sawmills constructed and run by groups of farmers or small communities to supply their needs as a whole. Several small mills of this character are in successful operation on the National Forests in the

great farming region of central Utah. The farmers who own them go up into the mountains with their teams for a month or more after the harvesting season, cut and haul logs to the mill, saw the logs into lumber, and haul the latter down to their farms for the next year's use. Opportunity is thus afforded to keep the farms in the vicinity of the National Forests supplied with wood for all purposes at a very slight cost, aside from the time of men and use of teams when ordinary farm work is slack. Not infrequently one finds timber cuttings in progress on the National Forests which are meant to supply the specialized industries of a region. Small mills in the Sierras, for example, are manufacturing National Forest timber into trays which are used in enormous quantities in the raisin belt and citrus-orchard districts of California. Other purchasers of timber from the Government are engaged in cutting fence posts in large quantities for the supply of farming communities, where the individual ranchers can not themselves go to the mountains to procure such material.

The free-use privilege was taken advantage of during the past year by over 34,000 persons, who obtained material entirely without charge aggregating 120,500,000 board feet and with a total real value of $183,000. Through these privileges and through the public control of the timber, local communities at a distance from the general lumber markets are protected from the excessive prices which frequently obtain where the small man is unable to protect himself on account of the control of supplies by private individuals.

GRAZING.

One of the greatest benefits of the National Forests to the farmers is the protected range which is given to them for their stock. On about two-thirds of the area of the Forests there is more or less forage. Like other resources this is put to use, and more than 9,400,000 cattle, sheep, horses, swine, and goats graze on the Forest range. The grazing is under Government regulation, so that the forests are not injured and at the same time the ranges are not overstocked.

Every farmer is to a certain extent a stockman. When his farm is remote from markets it is the live stock which yields him his income. This is especially true of the farms

in and near the National Forests, most of which are at considerable distances from centers of population and where the transportation facilities are still very poor. If the farmer can secure suitable grazing grounds upon which his stock may remain during the summer, a period averaging throughout the West about five months, he is thereby relieved of the care and expense of maintaining them upon his own land, and the feed they would otherwise have eaten during the summer is accumulated for winter use. It is precisely at this point that the National Forests serve to meet his special needs, for the farmer is given preference in use of the forage on the Forests. Every man is allowed to graze 10 milch and work animals entirely free of charge. He is then preferred before all others in further grazing privileges, for which he pays a very moderate fee. The regulation of the use of the ranges gives him protection, so that he is sure of having enough forage to carry his stock through the summer. *Prior to the creation of the various National Forests* the small live-stock owner was practically prohibited from utilizing the ranges adjacent to his lands because they were already stocked to their utmost capacity by larger owners. If in one year there was enough feed for the farmer's stock the next year some large outfit might sweep through and use it all. The small man could not afford to turn his few head loose among such large herds because of the danger of the animals straying to remote ranges.

As a concrete example of how the present Government policy has encouraged and built up the production of live stock by farmers, the Manti Forest, in the State of Utah, may be cited. This Forest lies between two very productive valleys in central Utah, where the demand for farms is so great that the farm unit is being reduced every year, the average for 1914 being 38 acres. When the Forest was created the ranges were practically monopolized by the large herds. Now the Forest range is occupied almost wholly by the stock of the farmers living in the near-by valleys. During the season of 1914, 1,259 permits were issued for the grazing of cattle and horses and 513 permits for the grazing of sheep upon this Forest. The ownership of these animals was divided as follows: Permits for 1 to 40 cattle, 1,185 owners; 41 to 100, 61 owners; above 100 cattle, 13; from 1 to 1,000

sheep, 506 owners; above 1,000, only 7. Several hundred cattle permits were for less than 10 head and dozens of the sheep permits for less than 75 head. The average number of sheep grazed per permit was 290 head, and the average number of cattle and horses was 15. This shows how the small owners are taken care of.

It will be seen to what an extent the farmers in the valley surrounding the Manti Forest depend upon it as an aid to their farming operations. Every year there are applications from new settlers who desire grazing privileges for from 1 to 10 head of cattle, and the larger owners are being continually reduced to make room for this class of permittees. These farmers turn their stock into the Forest in the early spring and return them to their farms in the fall, when those which are ready for market are sold, while the breeding stock is wintered upon the farm. It is an attested fact that stock sold from the Forest ranges weigh more and bring better prices per pound that the same class of stock from the open ranges outside the Forests. It is also true that these farmers could not successfully operate such small farm units without the aid of the Forest ranges. This is the sort of result that is being secured on all the National Forests where there is grazing land and near-by farms. Every year a larger number of permits are issued to small owners. In fact, out of 29,000 permits, 24,000 are for small men, chiefly farmers living in and near the Forests.

The development of the dry-farming principle, which is bringing under cultivation large areas of land hitherto believed to be incapable of producing agricultural crops, can be successfully carried through only by maintaining live stock to eat the rough forage crops which are produced upon the majority of such farms. If the dry farmer can depend upon obtaining range for part or all of his surplus stock within the neighboring Forests, he will be able to add very materially to the meat production of the nation and at the same time develop his land much more rapidly.

In many parts of the West the dairying industry is rapidly growing, and applications from settlers for range within the Forests upon which to graze their dairy cattle are being received in large numbers. To meet this situation certain areas have been reserved exclusively for this class of animals,

and drift fences have been erected to prevent the dairy cattle from mixing with the purely beef herds around them, and also from wandering from their own ranges. Already farms in and near the Forests bring a higher price in the market by reason of the grazing privileges which the farmer has for his stock.

BENEFITS FROM INDUSTRIAL DEVELOPMENT.

The Government is aiming to secure a development of all the various natural resources in the National Forests. This means the establishment of new industries of all kinds; it means, further, that the industries will be permanent ones, because the resources upon which they depend are being handled conservatively; it means the development of communities, towns, and even cities; it means more people working to create wealth and an increased demand for all the products of the farm. It means, therefore, for the farmer, a greatly increased market for his products. Every timber sale means development of the lumber industry, with the establishment of camps in the Forest to log out the timber and a sawmill established for its manufacture. There is developed immediately a market for all food products raised on the farm to supply the needs of the men employed in the work; there is also created a demand for grain and hay for the horses and mules used in the various lumbering operations. Very commonly a large timber sale means a railroad, either a main line or a branch line, and all extensive railroads built under National Forest contracts must be common carriers. In many instances this means not only that more people are brought into the farming communities, but that still greater markets become available by shipping over the railroad. Exactly the same process follows every substantial mining development.

There is one industrial development going on very rapidly in the National Forests which is often overlooked as an industry, and that is the development of the recreation resources. Throughout the National Forests there are a multitude of small lakes and streams and points of special scenic attraction. Many thousands of people are going every year into the National Forests for recreation purposes. Probably not less than 1½ million pleasure seekers

use the Forests in this way every year. The development of the recreation resources is being encouraged by the Government in every way possible. Not only are the points of special interest being protected from injury by forest fires or otherwise, but improvements in the way of roads and trails are very rapidly making these interesting areas available to the public. In consequence hotels and cottages are being built around the lakes and at other points, and summer communities are springing up in great numbers. Such a community establishes a market for produce from the neighboring farms.

THE FARMER AS A CAMPER.

In many sections the people making use of the Forests for recreation are the farmers who live in the hot valley at the foot of the mountains. Thus, for example, in California, when the fruit-canning season closes in the hot San Joaquin Valley, thousands of small farm owners load up a camp outfit on a wagon and start for the Sierra and Sequoia National Forests. Each takes his wife, children, and dogs, and while the family gain new health in the timber camp on the edge of some mountain meadow, the farmer cuts his year's supply of cedar fence posts, and shoots the two deer which the law allows him.

In addition to the farmers' direct benefit from all development in the National Forests through increased markets for their products, there is immediately created a demand for labor and for the use of teams and other equipment. The Forest Service goes to the local ranchers, as well as to the lumber camps, for much of its labor in building trails and other work. Many of the patrolmen are young ranchmen having homes in or near the Forests. Exactly the same market for labor follows the use of the resources.

In some localities farmers work at certain seasons of the year in the National Forests cutting timber for sale, just as the New England farmer puts in time in the winter, when he has no other work for himself and his teams, getting out material from his own woodlot. The advantage to the farmer of being able to employ his time in off seasons profitably is self-evident. Where a local market exists the farmer can go into the National Forests, make a purchase of timber

on the stump at a reasonable price, and go to work. This is already a very valuable opportunity for many western settlers. The Forest officers prescribe methods of cutting which insure the maintenance of the forests and prevent unnecessary waste. As the country about the Forest becomes more fully populated the value of the opportunity thus afforded will increase. The farmer has his timber supplies taken care of by the Government without cost to him, and in consequence is often better off than the eastern farmer who must pay taxes on his woodlot, perhaps at an excessive valuation. Of the over 8,000 small commercial timber sales involving amounts worth $500 or less, made by the Forest Service each year, a large proportion are made to farmers, who, in connection with their ranches, run wood yards, small sawmills, and local lumber yards, or who distribute fence posts to a considerable agricultural district. Upward of 200 small sales are made annually in the vicinity of Butte, Mont., chiefly to farmers who cut and haul cordwood, mining stulls, mine props, mine lagging, converter poles, and the like from the Forests to supply the mining market of that region. Elsewhere many small timber contracts are let to farmers who cut a few thousand railroad ties each winter for delivery to some local line.. Other farmers take out telephone poles in small lots, shingle bolts to be sold to some local mill, or small quantities of saw timber which are sold to local manufacturers. One of the interesting results of the establishment of National Forests in the Southern Appalachians is to bring employment to many of the people living in the mountains—employment not only in public works, but also through taking small contracts in cutting and hauling logs, piling, acid wood, and fuel. Such opportunities are often a stimulus to an entire community.

PUBLIC IMPROVEMENTS.

One of the farmer's first needs is adequate transportation. Millions of acres of farm land are to-day undeveloped because of the lack of good roads. In opening a new country, road building constitutes a hard problem for the settlers. At first their number is small; every man is struggling to erect his home and farm buildings and to clear the land; during the period of actually establishing the farm there is little or no

income from it, and usually the settlers can not afford to pay high taxes. Under such circumstances the burden of road building is so great that development is slow, and in thousands of cases the settlers give it up entirely and abandon their homesteads. The National Forests comprise the remotest and least settled localities. In many cases farming in these regions is still pioneer work, under as difficult conditions as ever existed anywhere in this country. Near the Forests are very large areas of excellent agricultural lands lying idle, lands capable of supporting many thousands of families and adding greatly to the food supply of the regions. One reason for the failure to develop this land has already been mentioned, namely, the excessive speculative prices at which it is held. That is a problem that will have to be met in large part by the communities themselves, which have the power of taxation. But one great reason also why a good deal of this land lies idle is the lack of roads. Every reason exists why the public should aid in this matter, because it is of vital importance to the public to have these lands put to productive use.

This problem is being met in two ways: First, by the work of public improvements being carried on by the Government in the Forests, and, second, by the direct contribution to the counties from a share in the receipts from the Forests. Every year the Government builds in the Forest roads, trails, bridges, telephone lines, and other improvements. The National Forests have been under administration only a decade, yet there have been already constructed 2,300 miles of roads, 21,000 miles of trails, 583 bridges, and 18,000 miles of telephone lines. Every one of these improvements benefits some settlers and ranchers. Many are the communities made accessible through the roads, bridges, and trails; many the ranchers who have been brought into profitable and pleasant communication with neighbors and outside places by the Forest Service telephones. Naturally the chief benefit of these improvements is to those who live within the boundaries of the Forests.

A direct contribution to the communities for roads and schools without reference to the Forest lines is provided for by Congress. There is appropriated annually for the use of the counties in which Forests lie 25 per cent of all gross

receipts earned from the sale of timber and from other resources, this to be used in road building and for schools. Where the resources of the Forests are marketable, the returns from this source are already very considerable. In the aggregate, nearly $900,000 is obtained in this way each year from the National Forest receipts, to be used locally in public improvements and schools. Some of the individual Forests are bringing in over $100,000 a year, and the business throughout the Forests is increasing so that the direct contribution to community upbuilding will soon be a very large one.

But in many of the Forests the resources are inaccessible and the greatest resource, the timber, is not salable under present conditions, except in small quantities. Under such circumstances the development of the Forest resources is slow, and there is but little direct return to the communities from Forest receipts. While ultimately these Forests will be of enormous importance to the country, the people need assistance now during the pioneer period of development. A great deal of the land in the counties in which the most heavily timbered National Forests are located is still a practical wilderness. The very foundation of any development in such sections is the construction of roads and bridges, and this is in many places enormously expensive. The clearing of the land for farming, the building of the homes, the building of schools, churches, and public improvements in the towns, in addition to the road building, are the burdens of a small, struggling population.

In many cases the National Forests occupy from 20 to 60 per cent of the area of the counties and contain timber of vast amount. Is there any wonder that the people are protesting that the Forests, which are not subject to taxes and are not yielding much from timber sales, are not contributing as they should to the development of their communities? Often they use the phrase that the Forests are blocking development or that the resources are locked up. This is, of course, not true, because the resources are available for use. What is meant, and what is true, is that the Forests are not contributing as they should to development of the communities in the counties in which the Forests are located.

Various proposals have been made, from time to time, looking to a possible solution of this problem. The most common proposal has been to abolish the National Forests and distribute the land among private owners in order that it may be brought under taxation. To make clear the utterly destructive character of such a program would need only a review of the scandals that accompanied the operation of the land laws as they pertained to timber lands, prior to the establishment of the National Forests, and a review of the results of private ownership of large areas of forest land where there has been no public control or public participation in the protection and handling of them. The National Forests will be one of the greatest sources of local prosperity. Publicly owned, they will be protected from destruction and their resources will be available for continuous service in building up and permanently maintaining local industries. Above all, they serve the public and their benefits can be shared by the average man instead of serving to enrich a few who might be in a position to secure control of them. The problem must be worked out in a way which will meet the immediate needs of the communities, without breaking down the integrity of the National Forests and withdrawing from the local communities the great benefits which will increasingly be derived from them.

Just such a constructive solution of the present difficulties of the settlers in heavily timbered National Forest counties has been proposed by the Secretary of Agriculture in his recent annual report. Briefly, this new policy proposes that where existing resources justify it and the public need can be demonstrated, future receipts from the National Forests be anticipated and advances be made by Congress for the construction of roads, bridges, and other public works, these advances to be returned to the Treasury from the sums which later on will be received when the timber can be placed on the market to advantage. This new policy would apply exclusively in those counties where there is a considerable area of Forest land, and so located that the resources can not be marketed at the present time, but later will yield a large revenue. Such a policy would fully meet the local difficulties arising from the fact that the National Forests are not subject to taxation. It would make the

Forest resources immediately realizable for public improvements; it would accomplish a development not possible without public aid; it would stimulate agricultural development; it would relieve the now struggling communities from a burden of taxation they would otherwise have to assume if the development of many of the National Forests communities is to go forward as rapidly as it should; it would hasten the development of the National Forest resources and aid in their protection; in every way it would work to help the small man. With such a plan in operation there would be removed the one barrier that now in a few places prevents the farmer from enjoying immediately the benefit of the National Forests.

THE ORGANIZATION OF A RURAL COMMUNITY.

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[Prepared for the Office of Markets and Rural Organization.]

GENERAL OUTLINES OF THE PLAN.

NO single plan of organization will suit all rural communities. There must be a clear and definite need for organization before any organization can hope to succeed. Since the needs of different rural communities differ, it must follow that the plans of organization must differ also, at least in some of their details. The plan here presented is intended only as a general guide, to be followed so far as it seems to meet the needs of any community which is studying the problem of organization. They who are on the ground and know the local conditions must determine for themselves how far this plan fits the case.

It is presented in the form of a general comprehensive organization of the whole community. Such an organization is desirable wherever possible. However, some parts of this plan ought to be of use to every existing organization in a rural community, however narrow its scope or purpose. The Boy Scouts ought to find suggestions for useful work in some of the details of this plan, the Camp-fire Girls in others, the various church societies and committees in others, the Grange, the Farmers' Union, and other farmers' organizations in others, and the country school could become an effective agency in every part of this plan.

It is not a plan for the "uplifting" of the farmer. The farmers are quite capable of taking care of themselves, but they have not yet taken up the work of *organized* self-help as completely as could be desired. It is hoped that this plan may persuade more of them to study the need for and results of organization, and to act in accordance with the results of their study, than have ever done so before. It is of the utmost importance that careful study should precede action. Hasty, ill-considered action is likely to lead to mistakes and failures. A few bad mistakes and conspicuous failures will discredit the whole movement and put it back for a generation.

The plan is similar to that of the chambers of commerce in some of our cities. The whole membership of the organization is to be divided into committees, each member being assigned to one committee. Naturally each one should be assigned to that committee whose work interests him or her most.

There is to be a central or executive committee composed of the president of the organization, its secretary, its treasurer, and the chairmen of the various committees. This central committee should direct the general policy of the organization, have charge of all property, either owned or rented, raise all funds needed, control them and their expenditure, appoint all paid officers, such as secretaries, inspectors, packers, business managers, etc., if any are needed, determine their salaries, and conduct all correspondence with other organizations of a similar character, as well as with business or banking houses, railroad companies, manufacturers, etc.

ORGANIZATION FOR DEFINITE PURPOSES.

Not only must there be a distinct need for organization, but each committee should be constructed to deal with one specific need. The first thing to decide, therefore, is what are the principal needs of the community in question, in order that the proper committee may be constituted. As a result of considerable study of this question the author has reached the conclusion that the 10 principal needs for organization in the average rural community in the United States are as follows:

The needs of rural communities.

- Needs of rural communities which require organization ....
  - I. Business needs..
    - 1. Better farm production.
    - 2. Better marketing facilities.
    - 3. Better means of securing farm supplies.
    - 4. Better credit facilities.
    - 5. Better means of communication:
      - A. Roads.
      - B. Telephones.
  - II. Social needs....
    - 1. Better educational facilities.
    - 2. Better sanitation.
    - 3. Better opportunities for recreation.
    - 4. Beautification of the countryside.
    - 5. Better home economics.

For any rural community which this statement happens to fit, whose citizens are convinced that these are their 10 principal needs, the plan of organization shown later is recommended (fig. 1, p. 92).

ADVANTAGES OF ORGANIZATION.

It ought not to be difficult to convince the farmers of any community that they need organization. There is probably not a farming community in the United States which does not need some, at least, of the things named in the above outline. Yet none of these things can be secured by individual farmers each working alone. Some form of "team work" will be found necessary or advantageous in every case. They who can not or will not work together are always in a weak position when brought into competition with those who can and do. Team work counts as much in business competition as in athletic contests; but the team work, in either case, needs to be wisely directed according to a well-considered plan.

At the very beginning let us acknowledge the excellent work already done by a number of farmers' organizations. They have undertaken a stupendous task, and they have grappled with it courageously. There are now more than 6½ million farmers in the United States; they are widely scattered; they have a great diversity of interests, many of which are difficult to harmonize, and farmers are temperamentally an independent, individualistic class, and therefore difficult to organize. In view of these facts, it is not difficult to understand why the progress in organization has been slow. The recognition of the work of rural organization by the Secretary of Agriculture as a legitimate part of the work of his department should be a great help, and will probably mark an epoch in the history of American agriculture.

WHY AMERICAN AGRICULTURE HAS NOT BEEN WELL ORGANIZED.

Since the opening up of the vast territory west of the Appalachians and the first beginnings of the public-land policy of the United States, the farming in this country has been more individualistic and less organized than that of

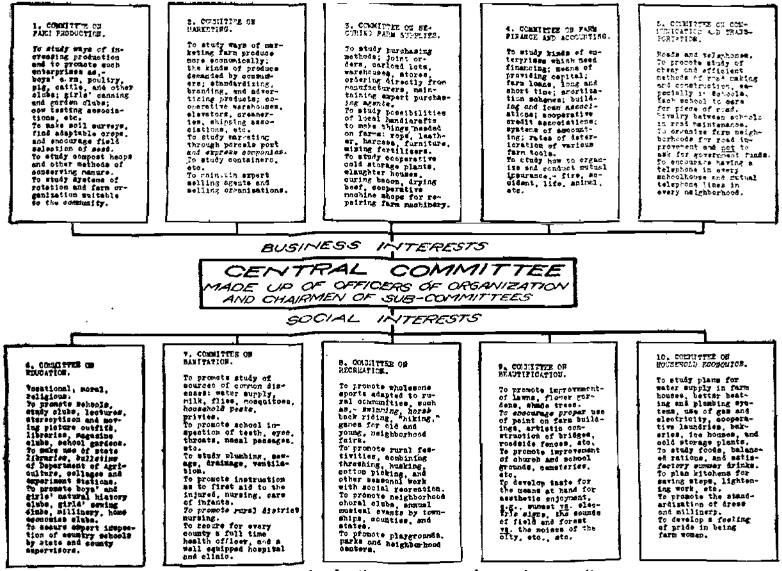

Fig. 1.—Outline plan for the organization of a rural community.

any other civilized country. Our methods of disposing of the public lands, under the preemption and homestead acts, encouraged this system. Each settler was treated as an isolated individual and his farm as an isolated economic unit. Settlers found themselves thrown together as neighbors without previous acquaintance.

So long as there was an abundance of fertile soil to be had for the trouble of living on it, agriculture could flourish under this system, and the statistics of agricultural production and exportation could continue to swell. The individual farmer frequently remained poor, or profited, if at all, through the rise in the value of his land rather than through the sale of his products. This condition of the individual farmer did not always attract the attention of statesmen and publicists. They were interested rather in the expanding figures of total national production and exportation, to which they could always point with pride.

Only the best and most easily tilled lands were suitable for this kind of farming. The result has been, as ascertained by a recent inquiry of the Secretary of Agriculture, that only a fraction of the tillable land even of the humid portion of the country has been reduced to cultivation. The tendency has been to pass by the second and third grade lands, or the lands whose initial expense of cultivation was high, and select the best and most easily cultivated lands. The time has now arrived when the continuation of that policy is carrying our pioneer farmers beyond the boundaries of the United States into Canada and Mexico. Meanwhile vast areas of tillable land at home remain neglected.

CONSEQUENCES OF LACK OF ORGANIZATION.

If it were invariably true that superior lands beyond our own boundaries were being taken up to the neglect of inferior lands at home, there would be much to be said in favor of this policy. At any rate, it would be hard to find a convincing argument, aside from the appeal to patriotism, to show a farmer why he should remain on inferior land within our own borders when he might find superior land just over the boundary. But there are reasons for believing that this is not always nor even usually the case. In the first place,

the lands being sought are virgin soil, capable of profitable exploitation for a few years. They can be made to grow heavy yields of a single money crop, and that, too, a crop like wheat, for which there is a highly efficient and very active market. The farmer's marketing problem is solved for him, and he can continue his highly individualistic farming. The lands which he is passing by are frequently highly productive, but are suitable for various kinds of agricultural specialties.

Now, the characteristic of an agricultural specialty is that there is no organized market for it and it does not regularly sell at a quotable price. If it did, it would not be a specialty. The isolated small farmer could scarcely make a living by growing this kind of a crop unless he were near a large city, and even there he would probably have to give as much time and thought to the marketing of his crop as to the growing of it. If he were not thus favorably located he could scarcely market his specialty at all unless he were either growing it on a very large scale, so that he could maintain a selling agency of his own, or were cooperating with a group of other farmers for the same purpose. If they were thus organized they could make more off some of this land which is now being neglected than they could possibly make off the virgin lands of the far Northwest. But as isolated, unorganized farmers they can doubtless make more off those new lands growing a staple crop which almost markets itself. Until we succeed in developing an organized rural life—until our farmers are willing to work together instead of working as isolated, unorganized units—they will continue to neglect such lands as require organization for their successful cultivation and migrate to new lands which are capable of being farmed by the old methods.

A similar problem is met with in the promotion of irrigation farming. There are only a few places where an individual farmer can reclaim land and bring it under irrigation. Until some organization could be formed to handle the problem or until the State or Federal Government took up the matter, individual farmers ignored very productive irrigable land in favor of inferior land which had the advantage of being capable of individual reclamation. Again, there are vast areas which require drainage. In only a few

cases can this drainage be done by individual small farmers. Consequently these lands have generally been neglected in favor of lands which, though ultimately less productive, have the one advantage of being suitable for immediate cultivation by unorganized, individual farmers. Even Government enterprise, in the case of irrigation and drainage projects, unless supplemented by organized work on the part of the settlers, will prove insufficient. Such Government projects will eventually fail to attract settlers unless the Government sells the land to them below the cost of reclamation, which would be bad economy, or organizes them to work out their marketing and financial problems so as to enable them to make enough off the land to pay the cost of reclamation.

The issues which depend upon an organization which will bring about the utilization of lands now neglected are more far-reaching than most of us are prepared to believe. Passing by these lands in search of new land which is capable of successful cultivation without organization means a rapid expansion of our people over new territories, together with a very thin settlement of older territories. So long as we have plenty of new land within our own boundaries this will lead to no international complications. When this rapidly spreading farm population begins to cross our boundaries in large numbers such complications are inevitable. When they find governmental and social conditions satisfactory, trouble may be avoided. When they find them unsatisfactory to themselves—as they did in Texas and Hawaii, as the English did in South Africa, and as we are certain to do in countries whose civilization is different from our own—then trouble can not by any possibility be avoided. Therefore even the problem of international peace bears a close relation to our ability to find productive opportunities for our expanding rural population at home, and this in turn depends upon a rural organization which will make possible the successful farming of lands now being neglected.

Of more immediate importance in this connection than the problem of international peace is that of the preservation of the prosperity of the small farmer who does most of his own work on his own farm. His salvation depends upon his ability to compete with the large farmer or the farming

corporation. Two things threaten to place him under a handicap and to give the large farmer an advantage over him in competition. If these two things are allowed to operate, the big farmer will beat him in competition and force him down to a lower standard of living and possibly to extinction.

One thing which would tend in that direction is a large supply of cheap labor. The small farmer now has an advantage because of the difficulty which the big farmer has in getting help. So great is this difficulty that many of the bonanza farmers are giving up the fight and selling out to small farmers. That is, the big farms, the farms that can *only be cultivated by gangs of hired laborers, are being divided up. Give the owners of these farms an abundant supply* of cheap labor, make it easy for them to solve the problem of efficient help, and they will begin again to compete successfully with the small farmer who, because he does his own work, has no labor problem. If conditions remain such that the capitalistic farmer has great difficulty in getting help, the small farmer will continue to beat him in competition, *and the bonanza farm will continue to give way to the* one-family farm.

ORGANIZATION ESSENTIAL TO THE PRESERVATION OF THE SMALL FARMER.

Another thing which threatens the prosperity and even the existence of the small farmer is the handicap under which he finds himself in buying and selling. The big farmer who can buy and sell in large quantities, and also employ expert talent in buying and selling, and in securing credit, has an advantage over the small farmer who must buy and sell in small quantities and give his time and attention mainly to the growing of crops rather than to selling them. Much of the supposed economy of large-scale production, even in merchandising and manufacturing, is found, upon examination, to consist wholly in an advantage in bargaining; that is, in buying and selling. When it comes to the work of growing farm crops, as distinct from selling them and buying raw materials, the one-family farm is the most efficient unit that has yet been found. But the big farmer can beat the individual small farmer in buying and

selling. It would seem desirable, from the standpoint of national efficiency, to preserve the small farm as the productive unit, but to organize a number of small farms into larger units for buying and selling. Thus we should have the most efficient units both in producing and in buying and selling.

If this is not done, the only farmers who can enter successfully into the production of agricultural specialties, where the problem of marketing is greater than the problem of producing, will be the big, capitalistic farmers. The small farmer may hold his own in the growing of staple crops, in which field the problem of efficient production is perhaps greater than that of successful marketing. The reason for this is that there is a well-organized market for staple crops and the problem of marketing is therefore somewhat less difficult than in the case of agricultural specialties. But even in the growing of staple crops the small farmer will have a hard time of it if he is forced to compete with the big farm when it is cultivated by gangs of cheap laborers. The two worst enemies of the small farmer are the opponents of cooperative buying and selling on the one hand and the advocates of enlarged immigration to the rural districts on the other. The latter would help the big farmer in the buying of labor for his farm, and reduce the price of the small farmer's own labor when he undertook to sell it in the form of produce.

SPECIAL FEATURES OF THE PLAN.

I. BUSINESS INTERESTS.

1. Committee on Production.

Our plan for the organization of a rural community begins with the committee on production. The greater part of the actual work of production can probably be carried on most economically on individual farms of a size which can be cultivated mainly by the labor of one family. This calls for very little cooperation or organization. But the study of the problems of production can undoubtedly be carried on most effectively in cooperation. If a hundred men in a community are all studying the problem of growing the crops of that community, but each man studies alone and does not exchange ideas with his neighbors, each man profits only by

his own study: but if they meet frequently to discuss their common problems and to exchange ideas, each man profits not only by his own study but by that of all his neighbors. Again, much of the work of organized marketing must begin before there is anything to sell. It must begin with production. Successful marketing consists, first, in finding *out just what the consumers want and how they want it* packed and delivered. To get the whole community to grow a uniform product such as the consumers demand requires *organization of the community to standardize its production.* Again, to stimulate rivalry in improving the products of a community, both as to quality and quantity, requires an organization to recognize and show some appreciation of merit.

It will, of course, occur to anyone that the problem of marketing farm produce is the one which, more than any other in the list, is now attracting public attention and calling for organization. The problem of economic and efficient marketing—that is, of securing for the producer the largest *possible proportion of the price paid by the consumer*—is largely a problem of selling by grade rather than by inspection. So long as the farmer lived within hauling distance of the consumer, so long as he could haul his produce to town and show it to the consumer and allow him to examine it and "paw it over," this method of selling on inspection was satisfactory. When the producer lives at a great distance from the consumer this method becomes expensive, because, first, the process of inspection has to be repeated by several middlemen; second, it is physically impossible to handle goods on so large a scale where they are sold on inspection as where they are sold on grade. Wherever there is a highly efficient system of selling anything it will be found that there has been developed a system of grading and standardization; that is, the goods are inspected only once and are graded. Thereafter they are bought and sold by grade with no further inspection. The farmers are under the same inexorable economic laws as other people, and they will never be able to market their products with the maximum economy until they grade and standardize their own products so that they can move through the channels of trade toward the consumers without repeated inspections. But this can

not be done without organization. This ought to be a sufficient reason for having a committee on production in any well-organized rural community. Cooperation is not a magical scheme by which poor products or products which consumers do not want can be sold at a good price. The products must, to begin with, be such as to please the consumer, and they must be so uniform in quality as to give the consumer confidence. The products of a multitude of small farmers can be made uniform as to grading and packing by an organization and by no other means whatsoever. It is a waste of time and breath even to talk about it on any other basis.

Much excellent work is already being done by the boys' and girls' clubs toward the improvement of production. An

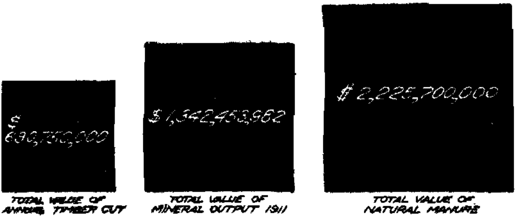

FIG. 2.—Comparison of annual timber cut and mineral output, with value of natural manure. (Figures for annual timber cut from Forest Service; for annual mineral output from Bureau of Mines; for value of natural manure from Farmers' Bulletin 192, p. 5, U. S. Department of Agriculture.)

organization such as is here outlined should through its committee on farm production promote all such work and cause it to spread and increase in efficiency. This committee should also study to discover new methods of increasing the productivity of the community, new crops, new and improved methods of soil treatment, the field selection of seed, scientific breeding of live stock, and even the conservation of manure. How important this last-named topic is may be shown by the figures in the accompanying diagram (fig. 2).

From this chart it will be seen that the value of natural manure alone is considerably greater than the combined value of the entire mineral output and timber cut of the United States. These items are considered important enough

to become political issues and to call for a national organization for their conservation. It is not here proposed that the conservation of our manure shall become an issue in national politics, but it is reasonable to suggest that it is important enough to occupy the attention of any organization whose purpose is to promote the prosperity of American agriculture. It is impossible to state just how much of this enormous value is wasted by neglect or improper handling. It it variously estimated as from one-fourth to one-half of the total. Assuming that one-third of it is wasted, we get the enormous sum of $741,900,000. This is certainly important enough to justify a considerable amount of study by a large number of local organizations.

Too much emphasis can hardly be laid on the importance of organized promotion of breeding enterprises. So long as this is left wholly to individual breeders, each one working alone, no great headway can be made by small farmers with little capital. Only those men who are in a position to invest heavily and advertise widely can do much in this direction. American farmers have accomplished something in the way of establishing new breeds of swine and poultry. These forms of live stock multiply more rapidly than any other of our common domesticated animals, and therefore it does not take so long to establish a breed. Outside of these two branches of animal husbandry our achievements are very limited. At this present moment it is doubtful if it can honestly be said that we have established a single new breed of cattle, sheep, or horses. We have depended wholly upon importation from abroad, and, in spite of the millions of dollars which have been expended for imported breeding stock, there is probably no European country which has so much poor stock as the United States, and there are not many where the average is so low.

One reason for our indifferent success in animal breeding has been the lack of neighborhood organization. Where a whole community is interested in the same breed of live stock, where practically every farm is a breeding station, there is, first, a wider basis of selection than where only one farm is given over to that breed. A wider basis of selection makes possible more scientific mating than is possible where there are only a few breeding animals from which to select.

In the second place, a neighborhood enterprise of this kind gives greater permanency and continuity than is possible where only a few individual farmers are interested. It has happened so often in this country that it may almost be said to be the rule that by the time a successful breeder has built up a superior herd, stud, or flock his life is drawing to a close, his sons have moved to town, and his animals are scattered. These animals may, after they are scattered, do something toward improving the general average of the animals of the community, but this is by no means certain. There are many chances that they will be crossed with other breeds, and the general tendency of haphazard cross-breeding is to produce mongrels. If, on the other hand, the whole community in which such a breeder lived were engaged in developing the same breed instead of a large number of different breeds, his animals would probably remain in the same neighborhood and be crossed with others of the same breed. When this happens the work of the individual breeder is not lost, but is enabled to count in the improvement of the stock of the country. Under our present highly individualistic methods, the farmer who enters upon a breeding enterprise frequently, if not generally, makes the initial mistake of selecting some breed which is new to his community in order that he may have something different from anything possessed by his neighbors. It is safe to say that a neighborhood whose farmers behave in this absurd manner will never become distinguished for the excellence of its live stock or of its field crops.

A third reason for our lack of success in animal breeding has already been suggested, i. e., the lack of stability of the average American farm family. Where the same farm stays in the same family for several generations, if it happens to be a breeding farm, there is time to build up a superior herd, stud, or flock. In the United States this does not often happen. The sons of a successful breeder have, in the past, frequently gone to a city to enter upon an urban business or profession. But even this instability of the farm family, which prevents the continuation of breeding enterprises over long periods of time is, in large measure, due to a lack of rural organization. This will be discussed more fully under the organization of the social interests of farm communities;

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but it may be permitted at this point in our discussion to call attention to the fact that well-to-do people leave the farms because the country does not furnish them the means of social and intellectual enjoyment which they crave. These things can be had only where there is an organized effort to build up the neighborhood on its social and educational side.

Another very definite advantage in neighborhood organization for the breeding of farm animals has been realized already in many communities. This is the opportunity which such an organization affords for the purchase and maintenance of expensive breeding animals. This may take the form (1) of purchasing a more expensive animal than would be economical for a single small farmer who could not use him to his full capacity, or (2) purchasing jointly a number of pure-bred males. Each animal thus purchased is kept on a single farm for two years. Then they are all changed around so that each animal serves on another farm for another two-year period, and so on as long as they are fit for service. In this way each animal can be used during his whole effective lifetime and his full value can be realized. Where an individual farmer purchases an animal of this kind, without the opportunity for a fair exchange, he must either sell the animal at a loss or run the risk of injuring his herd by undesirable inbreeding. Another advantage, not to be ignored, is the opportunity which the plan gives for more scientific mating. There being a larger number of pure-bred males in the neighborhood from which to select, arrangement can easily be made by which certain selected females can be mated with those males which have shown special prepotency.

In short, if the farmers of a given community will all adopt the same breeds of farm animals, and if the same breeding farm will remain in the same family generation after generation, and if the farmers will practice cooperative purchasing and maintaining of breeding animals on a large scale, we can soon hope to rival any European country in the excellence of our breeding stock.

2. Committee on Marketing.

The marketing of farm products must begin, as already stated, with the production of things that are marketable.

Four accomplishments must precede the actual selling of a product if the best results are to be secured, and each of these accomplishments calls for organization. They are:

(1) The improvement of the product. This ought to be one of the first results of cooperation. A group of farmers, all interested in growing the same product, by meeting frequently and discussing the problems connected with the growing of that product, will normally educate one another and thus improve their methods of production.

(2) The *standardization of the product through organized production and marketing*. Standardization follows naturally and easily if the cooperators are wise enough to see its importance. Not only must the product be a good product, but it must be graded according to the tastes or desires of the consumers or ultimate purchasers. If the producers insist upon throwing an unstandardized, nondescript product upon the market, the consumers, each one of whom wants a small and simple parcel and wants that to be of a certain kind and quality, will never buy of the producers. Some one, then, must intervene to do the grading and standardizing.

Individual growers, except where they produce on a commercial scale, are usually unable to grade their own products sufficiently to satisfy the trade. Their products should be pooled and the work of grading should be under the control of an organization whose employees have no personal interest in the goods. Such an arrangement makes it easier to secure an absolutely honest and uniform pack. In this way, too, producers will be able either to sell directly to the consumer or so to reduce the toll charged by the middleman as to enlarge their own profits.

(3) Branding. An excellent product, graded and standardized, must then be so branded or trade-marked as to enable the consumer to identify it or recognize it when he sees it. That is really all there is to the stamp on a coin. It adds nothing to the intrinsic value of the metal, but it makes it circulate. Without such a stamp each individual would have to weigh and test a piece of metal which was offered him and the circulation or salability of the metal would be greatly restricted, but a stamp upon it which the average receiver recognizes at once and in which he has confidence

makes him instantly willing to accept it. This may be an extreme case, but it does not differ in principle from the stamping of any other salable piece of material. A private stamp is quite as good as a Government stamp if people have as much confidence in it as they have in a Government stamp and if it is as reliable and as uniform. Private coins have circulated many times in the past. However, without taking such an extreme case as the coinage of metal, except by way of illustration, it will not take much argument to convince the average person that if a box of apples bearing a certain stamp or trade-mark gets to be known as reliable and good all the way through, the producer or the producing association whose stamp has thus gained confidence will be able to sell where unstamped products equally good will fail altogether.

(4) *Education of the consumer.* The consumer must be educated as to the meaning of a stamp or trade-mark on goods which are excellent in themselves and uniform in quality. This may call for some form of advertising which can be financed effectively only by an organization.

Let these four things be done and the problem of marketing will become fairly simple. But it must be remembered that these four things can be done only by organization.

After these four things are done, and not before, the organization should put an expert salesman, or selling agency, in the field to search for the best markets, to make favorable contracts with consumers and dealers, to secure satisfactory storage and transportation facilities, and to look after a multitude of details which require more technical knowledge than the average farmer, with his varied duties, has time to acquire.

There is probably no form of human effort where the old adage that "knowledge is power" is capable of greater emphasis than in the three commercial branches of the farmer's business, viz, the disposing of farm products, the procuring of farm supplies, and the securing of farm credit. More important, perhaps, than even the cooperative marketing of farm products is the knowledge on the part of the farmers that they can market cooperatively, and, in detail, just how it can be done. So long as they do not possess this knowledge, so long will the mercantile agencies who possess

a monopoly of the knowledge of all the marketing processes, the channels of trade, methods of doing business, methods of payment, collection, etc., have the farmers at a disadvantage. Of all forms of monopoly, a monopoly of knowledge is the most powerful. When dealers no longer possess this monopoly, when farmers are thoroughly informed on all these matters, then dealers will be compelled to do business at a reasonable profit; otherwise, the farmers will do it for themselves.

It is extremely improbable that cooperative marketing will ever entirely displace the system of marketing through private dealers. The latter can, if they will, handle the farmers' products, in many cases at least, as cheaply as the farmers themselves can. When the farmers are thoroughly organized and thoroughly informed on commercial methods, they can take their choice as between cooperative marketing and selling through private dealers. They will be prepared to adopt whichever method is more economical. Then the private dealers will be compelled to be as efficient and economical as a cooperative society or else get out of business altogether. There is no reason why they should not continue to do a large share of the business of handling farm products. Every economy which a farmers' cooperative society can practice will be open to the private dealers as well. It is only where farmers are unwilling to work together, or are uninformed as to commercial methods, that the private dealers are able to take advantage of them and charge an excessive toll on the products which pass through their hands.

It should be the business of the committee on marketing of farm products of a local organization to keep itself and the members of the organization thoroughly informed as to all the commercial practices involved in getting products from the farm to the consumer. This knowledge should include not only the regular channels through which the products move, but also all other possible channels, such as the parcels post and the express companies' service. Knowing how to use these channels may prove to be a very important advantage, without actually using them to any great extent. This knowledge may reduce the toll which can be charged upon goods passing through other channels.

One of the most vexatious questions connected with marketing is that of railroad transportation. The difficulty is not so much the freight cost in itself as the difficulty which the small farmer has of getting efficient service. Railroad companies, like all practical business houses, prefer a large business to a small business. The large shipper can command their attention when the small shipper can not. This is of particular importance to the shipper of perishable produce. A small shipper, who occasionally ships a carload, is subject to vexatious delays in getting cars, and, likewise, to frequent losses through failure of his loaded cars to arrive promptly at their destination. In the mass of traffic during a busy season they are more likely to be overlooked than those of a large shipper who sends many cars.

The remedy for this is the organization of a large number of producers in order to ship together. Such an organization can get the attention of the railroad management when a small shipper would be ignored. It is likewise possible for a large organization of this kind to keep in telegraphic communication with its agents at various places in order to be informed promptly upon the arrival or failure to arrive of its cars. Another tremendous advantage which such an organization possesses is that of being able to distribute its loaded cars to the various markets in proportion to their capacity to consume the products. A very high degree of efficiency is reached when the cars can be distributed after having been started on their way. It is this that has made possible the shipment of perishable products over very long distances.

It should be the work of the committee on marketing and transportation to act for the whole community in all cases where products are shipped out. Preferably, as stated above, producers should combine their shipments. But if there should not be a large number of producers of a given commodity, and if, therefore, each producer should be compelled to ship in small quantities, he should at least have the support and backing of an organized community. Entirely aside from this is the simple matter of keeping informed as to methods of procedure in dealing with railroad companies. This is the very least which our committee on marketing and transportation ought to undertake. It

should negotiate for accommodations, and it should keep itself and the whole neighborhood informed as to rates, accommodations, and the relative economy and efficiency of different methods of shipment.

3. COMMITTEE ON SECURING FARM SUPPLIES.

The importance of knowledge of commercial processes applies as well to the procuring of farm supplies as to the disposing of farm products. When the farmers are sufficiently well organized and sufficiently well informed to be able to dispense with the services of the various dealers who are supplying them, it may not be necessary actually to dispense with those services. The services will, however, have to be rendered at a cost to the farmer no higher than that of cooperative purchasing or manufacturing.

While farmers are perfecting their organization and acquiring knowledge and experience in commercial methods, they are hereby advised to proceed slowly and carefully. Until they have learned by experience it will be easy to underestimate the cost of running a store or other commercial agency and to overestimate the savings which they can effect. To make that mistake is to invite failure. This mistake is encouraged by a false theory and by a misinterpretation of certain experiences. The false theory is to the effect that, since a cooperative society can eliminate profits, it therefore must be able to do business cheaper than a private profit-making agency. While a cooperative society does eliminate that which goes under the name of profit, it does not in any way eliminate the necessity for a business manager. Unless the manager will donate his services charitably, he must be paid a salary. To get a good man requires a good salary. The private storekeeper in a country town usually does his own managing. Thus he saves the salary of a manager. More accurately, he receives his compensation in the form of a profit rather than in the form of a salary; whereas the manager of a cooperative society receives his compensation, if he receives any, in the form of a salary rather than in the form of profit. It may be that the storekeeper's profit is larger than necessary, or larger than would be necessary to pay the salary of a manager, but that is not always the case. It is never to be

assumed without study that something can be saved by a cooperative society merely because it eliminates "profit."

The misinterpretation of experience is found occasionally in the claim to large savings made by a group of people who order a large bill of goods at wholesale rates, go to the station after them, and do their own delivering and storing. It will readily be seen that though they save something on the price of goods thus ordered, they are not getting the same service as is given them by the local store. In the first place, they do their own delivering, which is an expensive part of the work of the local store. In the second place, they do not have to hire a salesman or clerk to do up their packages for them in convenient size, to show them goods from which to select, etc. In the third place, they do not maintain a storehouse for the goods, but each one stores in his own house, thus saving rent. In the fourth place, they do not have to keep a stock of goods on hand for customers; therefore they have no interest charge to carry. If these same people who save a considerable sum on a joint order were to try to run a store jointly they would have a rent charge, an interest charge, a clerk's salary, and a delivery charge to bear. These combined charges would reduce the savings by a considerable percentage, and would sometimes, but not always, wipe out the savings altogether.

There are three methods of purchasing farm supplies cooperatively. The simplest method is that of a joint order, where a group of farmers combine their orders so as to get a given article in large quantities—say, in carload lots. By offering cash or satisfactory security to a manufacturer they can frequently buy directly, thus saving middlemen's and agents' commissions, besides getting exactly what they want, instead of being compelled to take whatever the local dealer happens to have. Wherever possible these orders should be sent through the local dealer; that is, this should be done whenever the dealer is reliable and genuinely willing to act as the agent of the farmers rather than of the wholesaler or manufacturer. As the agent of the farmers he is in honor and in law bound to act in their interest, but when he is the agent of the wholesaler he is equally bound to act in his interest.

One method of procedure long familiar to business men and recently adopted by a number of farmers' organi-

zations is known as the order-form bill of lading. A detailed description of this plan will be furnished on application to the Office of Markets and Rural Organization. The essential features of the plan are: (1) combining the orders of a large number of farmers; (2) requiring each farmer to have on his order a banker's certificate that the money to pay the bill is on deposit, that the bank will pay the bill when a draft for the sum is attached to the bill of lading and the farmer certifies that the goods as ordered are at the depot. This method protects everybody concerned—the farmer, the wholesaler, the local organization, the bank, and the railroads. The farmer pays for what he gets and can inspect the goods before they are paid for. The wholesaler is safe, because the local bank guarantees payment. The local organization receives no money and incurs no obligation and the bank need not certify the order of anyone who does not actually have money on deposit.

The second method is like the one just described, with the addition of a warehouse. This warehouse is owned or rented cooperatively. Goods are ordered as in the first method, but when they arrive they may be unloaded and kept in the warehouse instead of being immediately hauled to the homes of the various farmers who have ordered them. Thus the cooperative group performs two of the functions ordinarily performed by the local store. It orders goods in advance and it stores them until they are needed by the individual farmers. It does not perform the other functions, such as displaying goods, serving customers, and delivering purchases. Sometimes manufacturers may be induced to place goods on exhibition in this kind of a warehouse in order to enable members to order from samples.

The third method is to run a cooperative store, which performs for the members of the organization all the services ordinarily performed by a privately owned store. A group of farmers who have not had commercial experience will generally find it wise to begin with the first and simplest of these methods rather than with the second or third. If they can operate the simplest plan successfully and with profit to themselves, they may then, if they can figure a further profit, undertake the second. The third is only to be undertaken after the most careful consideration on the basis of actual experience.

Experience has shown that where a cooperative store is undertaken it should not attempt to cut prices, but should sell at the regular, current prices, such as are charged at the other local stores. If there is a profit at the end of the year, a dividend should be declared on the basis of the amount purchased by each member; that is, if there is a profit of 7 per cent on all the business done, each member should receive a check at the end of the year for 7 per cent of the total amount purchased by him during the year.

One very successful store, however—and there are probably others—runs on the opposite principle of selling at a fixed percentage above cost; that is, it adds 3 per cent to the cost of each article and pays the running expenses of the store out of this small margin. It began, however, by charging an advance of 10 per cent, but has since, by careful management, been able to reduce this to 3 per cent. This is very unusual. Though it is located in a town, it absolutely refuses to sell to any but members, who must be farmers. It discounts all its bills and does its business in a prompt and efficient way.

Just here is the difference between a cooperative society and an ordinary, profit-making, joint-stock company. In the latter profits are divided in proportion to the shares owned instead of in proportion to the amount of business done by the different members. Thus in a store run by a joint-stock company, if A owned 10 shares and B only 1—that is, if A had invested ten times as much as B at the beginning—A would receive ten times as much profit as B, even though the latter had purchased ten times as much during the year. But in the cooperative store, if B had purchased ten times as much as A, his dividend at the end of the year would be ten times as great as A's, even though A had invested ten times as much. Ordinarily, however, each share of capital will receive a fixed rate of interest.

In order to safeguard this point it is necessary, wherever the laws of the State will permit, to restrict the voting powers of shareholders. A method commonly advocated by students of cooperation is that each member shall have one vote, regardless of the number of shares owned by him, instead of having a vote for every share. The objection to the common method of voting by shares is that the management

of the organization is likely to be run in the interest of those who own the shares instead of those who do the most business with the society. If, for example, a certain individual should own a large number of shares, but have very little business with the association, he would naturally be more interested in getting dividends on his shares than in getting goods at a low price. If a majority of the shares were owned by a few men in this situation, they could outvote the others and control the organization in their own interest. The "one-man-one-vote" method prevents this, though there may be other methods which can be used in those States which have not yet passed satisfactory laws relating to cooperative organizations. One such method is to limit the number of shares which can be owned by one individual. In all cases, however, before a cooperative society is formed, the advice of a reliable lawyer, familiar with the laws of the State, should be secured.

But the problem of securing farm supplies is not limited to the subject of purchasing. Of equal importance is the subject of producing things on the farm or in the neighborhood for the supply of the needs of the farmers. Our committee on securing farm supplies should therefore give careful attention to possibilities of this kind, especially in those sections of the country where farmers are in the habit of selling everything they grow and buying everything they use. Where this system prevails the farmer invariably sells at wholesale and buys at retail, thus reversing the ordinary commercial method. Except where the farmers produce high-priced specialties, such as oranges or garden truck, this method will keep them on the verge of bankruptcy. Their only way out of the difficulty is to produce more of the things they use, even though it should to some slight degree reduce the amount they have to sell. The advantage of this is that what the farmer produces for himself he produces for the best possible market, and he should credit this part of his business with the retail prices which he would have to pay if he purchased the articles in question.

These remarks are not to be interpreted, however, as meaning that the farmer should attempt to produce everything he uses. That would be obviously uneconomical. It is only where he finds that he can actually save money by so doing

that this is advisable. This will be found to be the case more often than is commonly supposed. Many articles in common use are sold at retail at prices which have no perceptible relation to the cost of production as distinct from the cost of selling. It is not uncommon to find a great selling organization whose purpose is to control the sale over a large territory. Manufacturing is carried on merely to supply this great selling organization with the stuff it sells. The cost of manufacturing is frequently only an insignificant fraction of the retail price. One case, perhaps somewhat extreme, is that of a certain class of dyes which can be produced by anyone who knows how at about 1 per cent of the price which he would be compelled to pay at the local store. Without a great selling organization he could not sell his product at all, except perhaps to a few of his neighbors. The company which produces and sells the article bends all its energies to the control of the sales, manufacturing being a mere incident. While a farmers' club could not compete with this company in selling the product on the market without investing large sums in a selling organization, it could easily supply its own members at a small fraction of the price which they now have to pay. There are multitudes of other cases similar to this, though many of them are less extreme.

Here, as in the case of marketing and purchasing, "knowledge is power." If the farmers do not know how they can supply themselves, others can charge them exorbitant prices, especially those companies which make a specialty of selling rather than of producing. While the individual farmer can not be expected to know all these things, a special committee of a farmers' organization should make it its business to study ways of beating the game of the exploiter. One way is to study ways of producing at home articles whose retail prices are so far above the cost of production as to make home production economical.

4. Committee on Farm Finance and Accounting.

Probably no subject connected with agriculture, unless it be that of marketing, has recently attracted so much attention as that of farm credit. Undoubtedly credit conditions are bad in some parts of the country. In spite of the fact that Americans are better supplied with banks than any other country and more in the habit of using them, our

banking system has only partly met the needs of farmers. The main reason is, undoubtedly, that farmers need credit, if at all, for longer periods than do business men in the cities, whereas a commercial bank, doing a regular check and deposit business, can not let a large share of its funds out for long periods. The nature of its business requires that it shall keep its funds as liquid as possible; that is, that they shall always be available within a short period. In order to meet more fully the needs of farmers it seems necessary to provide a special class of institutions.

The committee of our local organization which handles this subject should also handle the question of farm accounting and insurance. It should handle the former especially, because the first thing to determine in the problem of farm credit is what farm enterprises are worth financing; that is, what could the farmers do if they could borrow more money which would surely be profitable to themselves. Without this knowledge, the more they borrow the worse off they will be, no matter how low the rate of interest. What enterprises will be sure money-makers for the farmers is not to be determined by guesswork; it is to be determined by careful accountancy and by no other method whatsoever.

The promotion of farm accounting and the study of farm accounts in order to find out what farm enterprises can safely be financed is the first duty of this committee. The next is to find out how these enterprises can be financed on the most favorable terms. The latter is often the easier problem of the two. If our committee can say with certainty to the local banker, "If these farmers can get the money to buy brood sows or dairy cows or fertilizer, it will be very profitable to them, and they will certainly have the money to meet the loan when it is due," the banker, if he is alive to his own interests and those of his community, will certainly consider the matter favorably. If there is nothing definite of this kind which can be said to the banker—that is, if he is merely asked on general principles to lend money to farmers—he can not be blamed for a lack of enthusiasm. He is no friend of the farmer who makes him think that he ought to have abundant credit merely because his land is good security. To extend him credit on that ground alone is a very good way of encouraging him to lose his land.

If, however, there is no local banker sufficiently alive to his opportunities or willing to justify his existence by financing genuinely productive enterprises at a reasonable rate of interest when they are pointed out to him, the committee should consider other ways of securing capital.

This problem is somewhat simpler in a community which is able to finance itself—that is, where there is a sufficient accumulation of capital to supply those who need it—from what it is in a community which has to bring capital in from the outside. In the former case it is only necessary to develop a local institution which can receive the loans or deposits of those who have a surplus and lend them out to those who want to borrow. One of the simplest plans for accomplishing this is the credit union or cooperative credit association. Institutions of this kind have had a remarkable development in European countries, and several States have passed laws permitting their organization in this country. Without going into detail, the essential features of this plan are very simple. A group of farmers organize themselves to receive deposits and make loans, assuming, of course, full responsibility for all deposits intrusted to their care. In Europe each member usually assumes unlimited liability for the obligations of the association. No one receives any pay except the secretary of the association, who keeps the books. It is not necessary to have either an office or a safe, though desk room in some one's office is usually necessary. The "bank," as it is commonly called, is open once a week—say, Saturday afternoon—for receiving deposits and making loans. No safe is necessary, for the reason that the deposits are usually all loaned out and no funds are kept on hand. In case there should be money on hand, the association can deposit it in the nearest commercial bank, just as an individual would do. By this method expenses can be kept down to a minimum. Having such low expenses, the association can pay almost as much on deposits as it charges on loans. For example, if it lends at 6 per cent it can pay 5 per cent, or if it lends at 5 per cent it can pay 4 per cent, and meet its running expenses out of the 1 per cent difference. If borrowers want more at 5 per cent than depositors are willing to deposit at 4 per cent, both rates can be raised to 6 per cent and 5 per cent,

respectively. If at the latter rates the depositors deposit more than borrowers will take, both rates can be lowered, always keeping the difference between the two rates unchanged. Some associations have found it possible to pay expenses on a difference of less than 1 per cent.

Another method similar to the last, but somewhat more highly developed, is the mutual savings bank. Institutions of this kind have become numerous in recent years in the northeastern sections of the United States, but here they are essentially savings institutions rather than credit associations. The reason for this is that there is a large wage and salary receiving population who need opportunities to save. They do not need opportunities to borrow, for the reason that they have no productive purposes to which they could devote borrowed capital. These institutions can, however, be made to serve the needs of borrowers where there is a population who need to borrow for productive purposes. As such they would be mere enlargements of the credit-union idea.

Such an institution would differ from the credit union mainly in the following particulars: (1) It would do a larger business; (2) it would be open regularly as do other banks—every week day; (3) it would have a regular place of business, with safes and other fixtures and paraphernalia pertaining to the banking business; (4) having heavier expenses than the credit unions, it would usually have to charge a higher interest on loans over and above that which is paid on deposits; (5) instead of unlimited liability, the members would assume the same liability as the shareholders of other banks, which, in this country, is usually double the par value of their shares. The mutual savings banks of the northeast, which, as stated above, are savings institutions for townspeople rather than credit institutions for farmers, do not have shares, and there is no financial liability. They are run as quasi-philanthropic institutions by men of large business experience.

In many of our States there is no legislative provision for a strictly mutual savings bank, but in many of them it will be possible to embody the essential principles of mutuality in the regular joint-stock form of organization. A reliable lawyer or banker, or some one who is familiar with the banking laws of the State, should in each case be consulted.

The essential principles of mutuality in a credit association are (1) that it should be an association of borrowers rather than of lenders; (2) it should be run in the interests of borrowers primarily; (3) the association as such should make no profit, aiming rather to increase the profits of its members in their regular business—that is, to enable borrowers to borrow at lower rates for productive purposes in order that their profits in these productive enterprises may be larger. A joint-stock savings bank may do all these things if its stock is owned by farmers and others whose chief interest is the promotion of agriculture rather than the securing of high dividends on their stock. The number of shares owned by any one person should be limited if the laws of the State will permit.

For supplying long-time or mortgage credit at low rates, one of the simplest and most familiar methods is that of the building and loan association or savings and loan association. These organizations were formed originally to enable townspeople to build homes and pay for them on easy terms; but they are easily adaptable to the purpose of enabling farmers to make permanent improvements. In fact, they have already gone extensively into this field, particularly in the State of Ohio. They lend to farmers who can furnish good mortgage security for making improvements on their farms, permitting them to pay back the loans on the amortization plan—that is, in semiannual or annual installments. They secure capital for making these loans by selling bonds to savers and investors. These bonds draw interest lower than that charged on loans, in order that there may be a margin to pay the running expenses of the business. These bonds are sold either for cash or on the installment plan. In the latter case they meet the needs of small investors who can save only small sums at a time.

Like all financial institutions, including even the regular commercial banks, these savings and loan associations should be closely supervised, inspected, and audited by public officials, either State or National. No such organization ought to be allowed to exist and handle other people's money without such inspection, and farmers ought to be warned against intrusting their affairs to any financial institution unless such inspection is provided for. The history of the

commercial banking business in this country, especially before the Civil War, abundantly proves the necessity of such inspection.

In order to attract capital into the community from outside sources, it is necessary that the community should have a good financial reputation: that is, it must be a community that has the reputation of paying its debts promptly. Here it is necessary to call attention to a popular error, namely, that *farm land is the best security in the world, and farmers* therefore should be able to borrow on better terms than anyone else. There are two difficulties with this argument. In the first place, farm land sometimes has a selling value far in excess of its present productive value. Land which is not now yielding its owner interest, say at 5 per cent, on a valuation of more than $50 an acre, sometimes sells for $100 an acre. The reason is that buyers are speculating on the future. They know that at the present time they can not sell the products at such rates as will yield them interest, after all expenses are paid, on $100 an acre, yet they expect to be able to do so at some time in the future. They are offering a price which is based not upon its present proved productivity, but upon its future expected productivity. People living at a distance do not always have the same confidence in the future value of the land as do those who are buying on this basis. Therefore they can not be blamed for being shy about sending their capital to such a community for investment at these high prices or about lending to others to invest on this kind of security. Thus the supply of loanable capital in such a community is limited.

From the standpoint of demand, however, these very conditions greatly increase the immediate demand for loanable funds. When everyone feels that land is certain to increase in value, everyone who can possibly do so wants to buy a piece of land. If he can borrow the money with which to purchase it, he feels sure that he can eventually sell out for enough to repay the loan and leave him a balance besides. Parenthetically we may say that this is a speculative rather than a productive purpose. It does not promote good farming; it merely promotes a rapid transfer of land titles. At any rate, the increased demand for loans and the limited

supply of loanable funds combine to make high interest rates. One advantage which old and thickly settled countries, such as most of the countries of Europe, have is that they have long ago passed out of this stage. There is comparatively little speculation in farm lands; farm values have settled down to a basis of proved productivity; their values are relatively stable and offer excellent security to the lender.

Again, even though land values are stable, a community may easily get a bad financial reputation which will serve to keep outside capital from coming in. A local community where the average borrower will take advantage of legal technicalities, where he will force the lender to resort to legal proceedings, where he will appeal to the sympathy which people instinctively feel for the "poor debtor" and make things generally uncomfortable for the lender, will always suffer from a scarcity of loanable funds, accompanied by high interest rates, no matter how good the land may be. One of the most important duties of our committee on farm finance and accounting, therefore, will be to study to give the neighborhood a good financial reputation.

In order to get capital from the outside on as favorable terms as possible it may be practicable to use both the credit union and the savings and loan association, the one for short-time credit and the other for long-time or mortgage credit. If there are not enough local deposits in the former to satisfy the productive needs of borrowers, the membership of the union may, on its joint note, negotiate a loan from a distance. The joint liability of all the members of the association increases the responsibility of each and correspondingly increases the security of the lender. With a fund of outside capital to begin with, supplemented by the savings of local depositors, the credit union should be able to meet the needs of its borrowers.

This matter of a joint note or other form of unlimited liability will prove a stumblingblock to some of our farmers. They should remember, however, that where one man indorses another's note, as many banks now require, the indorser assumes unlimited liability for the amount of the debt. Where a number of men go into a scheme which involves unlimited liability they virtually indorse one another's notes, or they in some cases sign a joint note.

Here it must be pointed out that cooperative credit is not for everybody. It is only for those who are known to be trustworthy. No one will indorse the note of a man who is *not known to be financially responsible.* Neither should a group of men admit to a credit association anyone whose note they would not be willing to indorse. Herr Raiffeisen, *the founder of the most successful system of cooperative credit* in Germany, laid down as one of the fundamental rules for his credit associations that no one should be admitted who was not known to be trustworthy and that any member who was found to be untrustworthy should be expelled. Any other policy would lead directly to failure and ruin.

It is not inconsistent with the highest ideals of democracy that character should be of advantage even in business. If they who possess sound moral character, which includes financial trustworthiness, have some economic advantage over those who do not, in the long run the former will prosper and the latter will fail. The former will more and more buy out the latter, because land will be worth more to the former than to the latter. By this principle of selection the quality of the population will gradually improve and the community gain in every way. Without some such method of capitalizing character, this principle of selection will not always operate.

Again, from the standpoint of the lender who lives at a distance and who must be induced to intrust his money to the community which is trying to finance itself, the fact that a number of men in that community have confidence enough in one another to indorse one another's notes, to sign a joint note, or to go into any credit scheme which involves unlimited liability, will make a favorable impression upon him. On the other hand, if 10 or more men who know one another can not be found who are willing to trust one another to this extent, it may be difficult to convince him (the distant lender who does not know any of them) that he should trust them with his funds.

The savings and loan association, while it must always limit itself to making loans to the local community, where all its members may be known to one another, where land values are well known to its officers and where the laws

under which it operates permit, may sell its bonds to distant investors if they can be persuaded to buy.

There are a number of private agencies operating in this field already. These are sometimes classed under the name of debenture companies. Starting with a fund of capital, such a company invests in farm mortgages, buying of some local bank or mortgage broker. When it has a certain sum in the form of farm mortgages, let us say $100,000, it deposits them with some large financial institution, say a trust company, for safe-keeping. The trust company certifies that these mortgages are on deposit. Against these mortgages and this certificate as security the debenture company then issues bonds to an equal amount, i. e., $100,000, paying a lower rate of interest than that received on the mortgages. If the investing public has confidence, it buys these bonds and thus provides funds for the purchase of another hundred thousand dollars worth of mortgages. This operation may be repeated several times. Thus the original fund of capital owned by the debenture company is made the basis of the investment of several times its amount in mortgages.

From the standpoint of the investor, these are the following elements making up the security of his investment: (1) The value of the mortgages themselves; (2) the credit of the local bank or mortgage broker, who is required to guarantee the mortgages; (3) the certificate of the trust company, which does nothing more than to state that the mortgages are on deposit; (4) the credit of the debenture company, which hazards at least its original investment and its general credit besides. Lately certain banks have gone into this kind of business and have added the amortization feature.

Many of the good features of all these institutions may be combined in a special class of farm-land banks which have been proposed for this country. They are modeled in part after the Landschaften which have played such an important part in the agricultural development of Germany. They may be either cooperative or joint-stock associations, according to the character of the legislation under which they are authorized and the preference of those who promote them. In case a cooperative organization is permitted by law and preferred by its members, the essential features of its work

should be to secure funds by the sale of bonds, pledging the combined security of the original members for their payment and to lend these funds on the most favorable terms possible to farmers, for productive purposes only, taking mortgages as security. These mortgages may in turn be used as a basis for new issues of bonds, and the new funds thus secured used for making new loans, etc. The interest received on mortgage loans should, of course, be enough higher than that paid on the bonds to enable the association to pay its running expenses out of the difference. The loans to farmers should be paid on the amortization plan.

Probably no form of cooperation has been so successful for so long a time in this country as that which is known as mutual insurance. Farmers' mutual insurance companies are spread over the entire country; but they are especially numerous in the States of New York, Pennsylvania, Michigan, Ohio, Illinois, Wisconsin, Iowa, and Minnesota. They are so familiar as to call for no description here. They furnish insurance at cost, they are cooperative, and they serve as examples of what farmers may gain by working together for their mutual interests.

5. Committee on Communication and Transportation.

Intercommunication is one of the primary factors of civilization. Every substantial increase in the efficiency of means of communication marks a new epoch of civilization. The railroads, the telegraph, and the telephone have often been cited as examples. It is not necessary, however, that we should confine our attention to these means of increasing long-distance communication. Important as this is, it is probably of less absolute importance than the communication of neighbor with neighbor by means of the spoken word and the commoner modes of locomotion. Yet it is just at this point that the people who live in the country are at a disadvantage as compared with those who live in the city. So far as long-distance communication is concerned, there is no great difference; but in the matter of short-distance communication the townsmen have a great advantage. The fact that country people live so far apart is what creates the difference. There is special need, therefore, that country people should have the best possible means of overcoming

distances which separate them from one another—distances measured in miles rather than in hundreds of miles.

As the characteristic evils of urban life grow out of congestion, so do the characteristic evils of rural life grow out of isolation. Except for a few rare souls, isolation means stagnation. The average person needs the stimulating influence of association with his fellows to keep his faculties up to their maximum activity. This aspect of the question is of greater importance even than the question of economical transportation of products, important as that is. Here again, the dweller in the country is at a disadvantage as compared with his urban fellow-citizen. In long-distance transportation the one is served approximately as well as the other. But it costs the average American farmer more to haul his produce from his farm to the nearest shipping point than it does to ship it by rail over a distance of 200 miles.

It is fairly clear, therefore, that any farmers' organization which aims to improve the economic and social well-being of its community must give a good deal of attention to the subject of local communication and transportation, especially to roads and telephones. Few subjects lend themselves better to the purposes of a country school than that of country roads. Each school should study its own roads and should at least consider the expediency of having complete charge of a small piece of roadway. The pupils should study road management and maintenance as a part of their school work. Such an organization as we are now contemplating ought to consider the question of offering a prize to that country school which keeps its piece of road in the best condition.

In this as in all other rural-organization work the keynote should be organized self-help. If as much energy were put forth in local self-help as is put forth in trying to get Government help for various social schemes, there would be much less need for Government help. Road improvement is a case in point.

Probably nothing has done more for country life than the rural telephone. Wherever it has come into general use it has overcome the isolation of farm life as nothing else could have done. But while some sections of the country are well served by this agency, there being a telephone in practically every farmhouse, there are, unfortunately, other sections

which have scarcely begun to realize its advantages. The trouble is not so much ignorance of methods of construction, maintenance, and operation—though there is a good deal of ignorance on these points—as inertia and unwillingness to work together, though sometimes the difficulty is increased by a lack of means. Obviously a telephone is of no use to anyone who does not wish to communicate with his neighbors, and unless there is neighborly feeling there will be little desire to communicate. One purpose of this committee must, therefore, be the development of this neighborly feeling. This feeling, however, grows by what it feeds on. Give the neighborhood easy means of neighborly communication and the neighborly spirit will in turn be developed among all normal and right-minded people.

II. SOCIAL INTERESTS.

Up to this point we have been discussing the organization of the business interests of rural communities. All rural improvement must undoubtedly begin on this foundation. But it must be remembered that no building is complete when the foundation is laid. In fact, the foundation is of no use unless something is to be built upon it. We have now to *consider what is to be done with the prosperity which will* come to a farming community when its business interests are well organized. It is of doubtful utility to grow excellent grain to feed to scrub stock; it is of more than doubtful utility to grow excellent grain, meat, fruits, and vegetables to feed to scrub people. By scrub people are meant they who, whatever their financial condition, have few ambitions or interests beyond the elementary wants of hunger, thirst, sex, and amusement. There will be very little profit in making a community prosperous unless the prosperity is to be used to support life on a somewhat higher plane than this low level of animal existence.

Most of us used to believe that the one thing needful for the improvement of country life was to increase the farmers' income. We are now beginning to discover that this is only half of the problem and by no means the most difficult half. We find, for example, that the wealthy farmer is even more inclined to move to town than is the unprosperous farmer.

In fact, he frequently moves to town because he has prospered in the country, has accumulated a competence, and is now able to retire to the city. It does not seem to have occurred to many of us to ask why he does not retire in the country. Whatever the reason, the undoubted fact is that he has not generally done so, but has retired to the city instead. Those sections of the country where agriculture has been most prosperous, where land is highest and farmers have grown rich in the largest numbers, are the very sections from which farmers have retired to town in the largest numbers, where there is the largest percentage of tenancy. In some of these sections we already find the schools, churches, and other civilizing agencies as badly run down as in the poorest sections, and we may confidently expect that they will all tend in that direction. There is no scourge or plague known to agricultural science which will more certainly destroy rural civilization and enterprise than absentee landlordism.

The only thing, apparently, which will cure this situation is to make the country so attractive that even the prosperous farmer, no matter how rich he may become, will prefer to remain in the country rather than to move to town. He is not likely to remain in the country if the town provides and the country lacks everything he wants and feels that he can afford.

There are five principal reasons and probably several minor reasons why the farmer who can afford to do so would like to move to town. First, town schools are generally better, or at least thought to be better, than country schools. It frequently turns out that the pupils of the country schools show more real training than those of the town schools. It is a question, however, whether they get their training in the country school or in the country home. Still, so long as people think the city school is better, farmers who have children will find in this a reason for moving to town if they are financially able to do so. Until country schools are so improved as to give to every country child as good an educational opportunity as is open to any city child we must expect that the people who appreciate education and who can afford city life will continue to move cityward. In the end this would leave in the country only those who cared little for education and those who, however much they

appreciated education, were not able to afford it; that is, those who were not able to live in town.

A second reason is found, or will be soon, in the better sanitary conditions found in the more progressive cities and towns. The country is still somewhat more healthful than the city, though there are some perverted statistics which aim to show the contrary. But the undoubted fact is that the cities are improving very rapidly in sanitation, and the time is not far distant, unless the country districts arouse themselves, when the cities will be more healthful than the country. Then there will be an additional reason why enlightened people should desire to move from the country to the city. This would be especially regrettable because it is so unnecessary. With all its natural advantages the country ought always to be more healthful than the city. If it is not, it merely proves that country people are negligent and have not taken hold of the problem with the same vigor as city people.

A third reason is found in the better opportunities for recreation which the city affords. Here, as in nearly every other respect, the country has a natural advantage. Recreation, however, is almost unthinkable without some kind of group action, and this is the very thing which country people lack and which city people possess. However, it is necessary to admit that certain kinds of recreation, so called, will be hard to supply in the country. The noise, glare, and excitement of city streets at night, which are so attractive to certain types of mind, can not well be supplied in the country. They who prefer this form of recreation, together with the products of the popular drama, where neurosis is so commonly mistaken for mentality, will probably continue to love the city, and they will be no loss to the country. But the opportunities for genuine *re*-creation through outdoor play and sport are so much better in the country than in the city that there is no excuse for any rural community which loses sound people because of a lack of such opportunities. However, most cities are trying to overcome their natural disadvantages by the establishment of parks, playgrounds, swimming pools, gymnasiums, etc. Unless the rural communities become more active than they have been, young men and women may be driven away by a lack of

recreational opportunities, or attracted to the cities by the superior advantages which they offer.

The desire for beauty, or the things which please the mind through the eye, is one of the first symptoms of a desire to rise above that plane of existence where interests are confined to the primary wants of hunger, thirst, and sex. If there is any one particular in which any rural community ought to excel any city it is in the superior opportunities it should offer for the gratification of this desire. But many cities are making heroic efforts to overcome their natural ugliness, whereas it seems that many rural communities are making almost equal efforts to destroy their natural beauty. Where this is the case there is a fourth reason, and a very strong one, why desirable people should leave the country and go to the city.

A fifth reason, and it is sometimes the strongest of all, is found in the lack of household conveniences in the country. The city home may have gas and electricity, must of necessity have hydrant water and sewage connection, usually has both hot and cold water, a bathtub, and a convenient heating system, besides a number of other conveniences to lighten the burdens of housekeeping. All these things are possible in the country as well as in the city, but they are actually less common. The chief reason is a lack of community action, which is the one advantage, here as elsewhere, of the city over the rural community. This, however, is a matter which lies within the power of any rural community to correct. It is simply a matter of working together.

If these things are not done—that is, if the city should for a long period of time have the advantage over the country in these five particulars—viz, in education, sanitation, recreation, beautification, and household conveniences—nothing can keep enlightened people from going to the cities, leaving the country to people who either do not care for these things or who are so inefficient as farmers that they can never accumulate enough to enable them to move to town. That is, instead of our present progressive, enlightened, self-respecting agricultural population, we shall drain off all the better elements, leaving only a "peasant" population, ignorant, stolid, unprogressive, and inefficient. Even the growing of crops must decline under such a system. For all these

reasons, it is quite as important that our local organization shall give attention to the social as to the business interests of rural people. There should be committees on education, sanitation, recreation, beautification, and household economics, and these committees should be regarded as quite as important as those dealing with business questions.

6. Committee on Education.

The key to most of the educational problems of the country is the country school. There is scarcely a single phase of country life in which the country school may not become a vitalizing factor. The boys' and girls' clubs should begin there. The study of farm production, of marketing, of sources of supply, of farm accounts, and of road and telephone construction should be a part of the work of the country school. But this work should be extended over the social interests of the community also. The knowledge of one's environment should include one's economic and social as well as one's physical environment. The first attention of the committee on education should obviously be directed toward the country schools.

There should be a distinct and persistent movement to make the country schools at least as efficient as the city schools. To accomplish this the entire school system of the State must eventually be supported and administered as a unit, as the school system of a city is now. Because one section of a city is less wealthy than another is not considered as a valid reason why the children of the poorer section should have poorer schools than those of the richer section. This policy should be made to apply to the entire State. Because there is less wealth in the country than in the city ought not to be considered as a valid reason why the country children should have poorer schools than the city children. They should all have equal support out of the tax fund of the entire State, and they should all be administered as a unit. If each ward of a city were restricted to the taxes of that ward for school purposes, it would often happen that the most populous wards, where there were the most children needing schools, would have the least money to support their schools, because of the scarcity of taxable property, while the least populous wards, where

children were scarcest, would have the most money for schools, because of the large amounts of taxable property. This *would be so obviously wasteful and inefficient that no* enlightened city would tolerate it. Yet that is precisely what happens in all of our States. Schools are supported, not in proportion to the need for them, which is the only correct principle, but mainly in proportion to the amount which *each community can raise.*

In order that the State school system can be administered as a unit there must be at the head of the State system a highly trained expert, not elected, but appointed as is the superintendent of a city school system. He should have ample power and an adequate staff of assistants and inspectors to enable him actually to inspect the schools of every county in the State.

Again, in each county there should be an educator, not elected as are county superintendents now, but appointed as are city superintendents, with ample power and a staff of assistants which will enable him to inspect and control every school in the county.

Until these things can be brought about through State legislation each community can do a great deal toward the improvement of its own schools through concerted action. The study of the broader questions of national economy may well be turned over to the higher institutions of learning, where students are more mature than they who attend the district school. But the questions of local or neighborhood economy, with which the study of economics ought always to begin, may be studied to advantage in every country school. In many States it is already possible to consolidate rural schools wherever the local communities are willing.

But the country school can not possibly do everything in the way of education that is needed. At any rate, there are some things which one can learn better outside of school than inside. The committee should study to utilize other educational resources, such as study clubs, natural-history clubs, circulating libraries, not of cheap fiction, but of solid reading which will be of use to the community. Use should also be made of such educational agencies as the stereopticon and motion-picture outfits, and lecturers from the State colleges.

7. Committee on Sanitation.

No committee of our organization has a greater opportunity for usefulness than the committee on sanitation. There is much to be learned by scientific research regarding sanitation, but scientific research should not be the work of this committee. Enough is already known to scientists to vastly improve the health of any rural community which will apply that knowledge. It should be the work of this committee to inform itself and the neighborhood as to what has already been discovered and demonstrated regarding the cause and prevention of the common diseases, such as malaria, typhoid fever, hookworm, tuberculosis, dysentery, etc., and to persuade the community to apply this knowledge. The application of this knowledge may sometimes require hard and persistent work; but when people realize clearly that babies can be killed with fly-infected food as well as with an ax, they ought to be willing to work as hard to exterminate the fly as they would to exterminate a gang of murderers who went about killing babies with axes. The reason they do not act promptly in the case of the fly and the mosquito is that they do not fully realize the danger from them. Our early pioneers acted vigorously to exterminate the wolf and the bear. Organized wolf hunts have been carried on in most of our States west of the Alleghenies within the memory of men now living. Even the rabbit has been the object of well-organized campaigns on the Pacific coast. The reason was that these pests were large enough to be seen, and the damage they did was visible to the eye. Therefore it was easy to realize the danger from them. When we realize with equal clearness the danger from insect and microscopic pests we shall probably act with equal vigor. It is not too much to hope that the time will come when the fly, the mosquito, and the hookworm, together with the germs of tuberculosis, typhoid fever, etc., will be as nearly extinct as wolves, bears, and panthers now are in the older States.

It is to be hoped that there will be soon, in every county, a full-time health officer, chosen because of his special knowledge of sanitary science, provided with ample power to compel obedience to the fundamental laws of sanitation, and

assisted by a corps of trained nurses and assistants who shall inspect every school, church, and public building, examine all school children, require all drains, privies, and wells to be constructed on scientific principles, and all dairy barns to be clean and wholesome, and do anything else which will improve the health and reduce the death rate of the country. Meanwhile each local organization should be active in all these directions without waiting for new legislation. A trained nurse may be supported in every county to do both school and district nursing in the open country. She could also give a limited amount of instruction to mothers' clubs and school children on the questions connected with the health of the people.

8. Committee on Recreation.

The young of all animals play as naturally as they eat and drink. The surest way to make one of them vicious is to suppress the instinct for play or allow it no opportunity to express itself. In human societies, which are controlled by the grown-ups who have forgotten something of their earlier interests, the play of the young is sometimes repressed, and seldom provided with adequate opportunities. This danger is even greater in the country than in the city, for the reason that the children of the farmer usually, and rightly, help with the farm work. But the farmer, who does not himself feel the need of very much play, and sees the pressing need of farm work, is in danger of allowing himself to exploit his children for his own profit and their injury. The same man who would not overwork a colt, realizing the difference between a colt and a mature horse, will sometimes overwork his own boys and girls. In the case of these young working animals, for as such they are sometimes regarded, it is not so much the strenuosity of their work which is likely to do them injury as the dull monotony of continued toil unrelieved by play or recreation.

Every hard-working person will easily understand how essential a reasonable amount of recreation is to the maintenance of a high state of mental and physical efficiency. He will then appreciate the statement that a rational standard of living must include a reasonable expenditure of time or money on recreation. Just what is a reasonable expenditure for this purpose may not be easy to determine,

though there need be no disagreement as to the general principle that too little recreation, which produces dullness of body and mind, is as bad as too much, which is mere dissipation or waste of time, energy, or money. Nor need there be any disagreement as to the principle that the recreation should be made such as to appeal to all members of the community. While economists generally approve a division of labor in industry, there are few who will approve that kind of division of labor in which most of the men work all the time and never play, while a few loafers amuse themselves all the time and never work.

Rural sports are a natural adjunct of rural festivals as a means of maintaining a wholesome and agreeable social life in the country. Owing to a natural excitability and tendency to excess, Americans have found it difficult to develop distinctive rural sports as a permanent and dignified institution of rural life except in a few favored localities. Fox hunting and horse racing tend, in this country, to be spoiled as rural sports by their affectation by urban magnates in the one case and livery-stable toughs in the other. Nothing is finer and more dignified than for a group of neighboring, well-to-do farmers to unite for a day's hunting when the purpose is to rid the country of vermin; but when a group of townsmen, who have learned to ride under a roof in a professional riding school, proceed to the country and advertise their solvency by chasing a timid fox across the farmers' fields, the sight is not calculated to inspire admiration. Nor is there any sport more fitting than for a group of horse-breeding farmers to meet for the purpose of testing their colts in a fair and open competition. It is only by such open competition that successful horse breeding is made possible. But when horse racing degenerates into a mere vaudeville "stunt," or, as is more frequently the case, into a mere opportunity for a group of professional gamblers from the purlieus of the livery stables, who have been initiated into the mysteries of race-track management, to enrich themselves at the expense of the uninitiated, it is not too much to say that it has lost its virtue as the inspirer of a wholesome and agreeable social life in the country.

In view of the well-known excitability of the American temperament and its tendency to excess, it is important that rural sport in this country should be of a character which does not lend itself readily to extreme specialization; otherwise it will tend to drift into the hands of specialists who do the playing while the public looks on. This produces a spectacle rather than a sport. It is also important that there should be considerable variety in the forms of sport in order that as many as possible should be able to participate. Of particular importance, however, is the requirement that these sports should fit into the seasonal character of rural work. City work is so uniform that the time for recreation can be evenly distributed throughout the year. Short hours with regular weekly, biweekly, or monthly half holidays give the city worker ample time for wholesome recreation. But since in every farming country there are rush sea-

sons, when short hours and half holidays would mean a loss of crops, it is obvious that recreation time can not be so evenly diffused. To make up for this it is desirable that during the seasons when work is slack there should be regular periods of recreation and games, which need not be crowded into a single afternoon.

This suggests the need also of regular annual festival occasions suited to each section of the country and its type of agriculture, when there can be a general relaxation from the strenuous toil of the rush seasons. In anticipation of such a period of jollity, the grinding fatigue of the busy season is borne with more patience, particularly by the young people, and the work is done more vigorously because more cheerfully. Again, there is the possibility of uniting social pleasures with rural work to a somewhat greater degree than is now done. If the spirit which showed itself among our ancestors in the barn raisings, log rollings, and similar occasions could be restored, it is possible that the present generation could get a great deal of social pleasure out of the thrashing season and other occasions of a similar character. This would seem to be the natural time for the harvest-home celebration, which has been so important an event in old rural civilizations. In former days, however, as the writer can testify, thrashing was such prodigiously hard work, and a great deal of it was so dusty and disagreeable, as to stifle any spirit of jollification which might otherwise have arisen. But with the more powerful engines and more highly improved machinery of the present, the hardest and most disagreeable part of the work of thrashing has been eliminated. Under such conditions it is at least a theoretical possibility that the thrashing season in any neighborhood might be made a festival occasion, to be participated in by women as well as by men—by priest, parson, and schoolma'am as well as by the farmers themselves. This, however, is only by way of suggestion.[1]

The highest form of social amusement is choral singing. This is peculiarly adapted to the needs of rural communities. In the first place, the equipment costs nothing. The human voice is not only the finest musical instrument known, but it is supplied free of charge to every human being. Training and practice under a competent instructor will, however, cost something. The money cost is usually less than the cost in time and practice. Again, as a matter of actual observation, it is found that group singing is a common practice in every country or community which has a wholesome rural life. Germany, Wales, and Denmark may be cited as conspicuous examples. Especially in the last-named country, which has so much to teach the rest of the world in the way of rural organization, group singing is one

[1] Quoted from the author's Principles of Rural Economics.

of the prominent features of the national life. Not only is every class in every school, from the primary school to the university, opened with a hymn, but practically every business meeting of every farmers' organization as well. When one hears a group of hard-headed, wide-awake Danish farmers, who have met together as directors of a cooperative bacon factory, join in a hymn at the opening of their meeting, one begins to understand why cooperation is so successful in Denmark. Back of business cooperation there is the cooperative spirit. This spirit is the result of years of education along cooperative lines.

In the city, where land is scarce, there may be some excuse for a lack of playgrounds. But in view of the fact that land is the one form of property which is abundant in the country, it would seem that a suitable playground could always be possible. It should, however, always be under the control of the civil authorities or a local organization, in order that it may not be monopolized by a few to the exclusion of the many, and in order that unsuitable language and conduct may be eliminated.

Aside from the recreational feature of rural sports, they have great value as socializing agencies. After people have learned to play together it is easier to learn to work together. Consistent working together will do more to increase the prosperity of the average rural community than any other single factor.

9. Committee on Beautification.

The committee on the beautification of the countryside will probably have the hardest work of any. Many farmers so pride themselves on their hardheadedness that their heads are in danger of becoming not only hard but impenetrable, and their hearts as well. A house tends to become for them merely a thing to furnish shelter and protection, not to please the eye; paint becomes a means of preserving wood, fences become means of restraining live stock, land a means of growing salable crops, church and school lots exist for the purpose of supporting buildings, and flowers are merely incidents to the production of fruits and seeds. Few, however, are so far gone as to regard a cemetery merely as a place to bury corpses. This most serious reminder of the realities of our earthly existence stirs in even the hardest

natures the rudiments at least of a somber idealism and leads them to expend some effort at beautification. Nor are there many who are so far gone as not to prefer a handsome, well-groomed team even when an ugly, ungroomed team might do as much work. Every good workman prefers tools with a fine finish, even though they do not do any more work than those without finish or polish. In short, part of the joy of living consists in the satisfaction which we get directly out of our tools—the things with which we work—as well as that which we get out of the products of our work. One can well afford to sacrifice a dollar of money income if by so doing one can add two dollars' worth of satisfaction to one's work.

These remarks apply as well to fences, bridges, and outbuildings as to the dwelling house, and they apply particularly to the general appearance of the farm itself. The man in the city does not usually live with his business—that is, he does not live in or near his factory, his store, or his shop. If he has any surplus income he will generally spend some of it in the adornment of his home surroundings, but he too frequently allows his place of business to remain unattractive and even repulsive, unless he finds that it attracts customers better by being made attractive. If he were compelled to live with his business, that is, in or adjacent to his factory, store, shop, or mine, he would find it impossible to get the maximum satisfaction out of life if these places of business were allowed, as they usually are, to remain ugly.

Just here is one of the largest differences between city and country life. Whereas in the city business and life are divorced, the place of business and the home are separated, and the source of income is considered apart from the place where the income is spent, quite the opposite is true in the country. There the farm is both place of business and home, both source of income and the place where it is spent. It would therefore be ridiculous to adorn the inside of the home and leave its surroundings ugly and repulsive. It would be an interesting digression to speculate as to what would happen in our cities if all city business men were compelled to live with their business. It would certainly make slums impossible and lead to a vast improvement of the factory districts—the elimination of smoke, noise, and other nuisances. However, that is a city and not a country problem.

In advocating a campaign for the beautification of the countryside it is not necessary to go so far as to sacrifice in any degree the productive efficiency of the farms. It is not proposed that farms shall be turned into parks. When tools are given a fine finish or polish they are not turned into toys; their working efficiency is not, or should not be, reduced in the slightest degree. Similarly, when the farm and its buildings, fences, hedges, etc., are made pleasing to the eye its productivity need not be at all diminished. Nor is it necessary that large sums of money should be spent on the beautification of the neighborhood or the individual farm. *Our committee on beautification will have enough work to* do in the average community if it merely develops in all the people an intelligent interest in the improvement of the general appearance of the neighborhood; first, through the improvement of school and church grounds, cemeteries, roadsides, bridges, and other public property; second, through the improvement of farm buildings by a better regard for proportion and a more intelligent use of paint, the artistic selection and location of trees and shrubs, and the care of lawns and gardens on individual farms.

10. Committee on Household Economics.

As previously suggested, one of the most powerful forces driving people from the country to the city is the lack of household conveniences in the country homes. The committee which can find ways of securing most of these conveniences will do a great deal toward making country life attractive and checking the movement from country to city. Every farmer learns to be handy with tools. With very little instruction he can put into his house many of the little things which reduce the drudgery of housework in city homes. Our committee should aim to furnish as much of this instruction as possible. Even if nothing more is done, it would be of value to collect drawings, illustrations, plans and specifications, price lists, and catalogues of all sorts of household improvements. Another possibility of usefulness for such a committee is the promotion of cooperative laundries, bakeries, ice houses, or ice factories.

But it must be remembered that these labor-saving improvements seldom reduce the amount of work. They merely

enable people to accomplish more with the same effort. Many labor-saving processes have been introduced into the farm home since the days of our grandmothers, and many kinds of work which our grandmothers did have been removed from the farmhouse to the factory. Yet it is doubtful if the ambitious farm woman of to-day works any less hard than did her grandmother; she merely does more things and supplies her family with comforts and luxuries which her grandmother never dreamed of having. And it may be confidently predicted that even if a hundred new labor-saving devices are introduced into the farm homes during the present generation, unless something else is done the women of the next generation will work just as hard as those of the present. They will merely accomplish more.

This increase in the results accomplished by work is altogether desirable as long as the results are desirable in themselves. But this is not always the case. Many of the things which we buy with our money, or get with our work, are not desirable for their own sakes; they are desired merely because others have them and we want to keep up with our neighbors. We are suffering infinitely more from competitive consumption than from competitive production.

One of the most destructive forms of competitive consumption is the effort which country people make to act and dress like city people. This desire to imitate city people indicates a feeling of inferiority on the part of country people. It will never be cured until country people organize themselves and develop a feeling of solidarity and a pride in being country people. When a class of people feel themselves to be the equals or superiors of another class they never try to imitate that other class.

Then there is the rivalry among members of the same class or community to outshine one another in matters of consumption, display, or ostentation. "Conspicuous waste" becomes a recognized method of advertising respectability. Where this spirit prevails, no matter how much money we have, we can never have enough to live in mental comfort, but will strive with might and main for more. Similarly, no matter how many labor-saving devices there may be in the farm home, the women can never do as much as they would like to do, but will continue to wear themselves out trying to do more.

One of the largest results, therefore, which should come from an effective rural organization should be such a standardization of consumption as to stop this form of strenuous competition. When country people stop trying to imitate city people, when they have the strength to set their own standards of consumption, and when they agree to do the things they really want to do and have the things they really want, then the introduction of labor-saving devices will really lighten work.

Earlier in this discussion attention has been directed to the work which the country school may do in the organization of a rural community. Attention should also be directed to the opportunities of the country church. To those who object that the church should not concern itself with temporal matters it is only necessary to reply that it must do so or perish. It is not for us to state what the church ought to do. That is for its own leaders to determine. As a mere question of cause and effect, setting aside for the moment all questions of moral obligation, the following considerations are presented to those leaders:

It is a law of rural economics that the best land of any community tends, in the long run, to pass into the hands of the best farmers. The reason is that they can afford to pay more for the land, either in the form of a purchase price or in the form of rent, than poorer farmers. The farmer who can make 100 bushels of corn grow where others can make only 50 cau pay more for the land. In the long run he and others like him will outbid the poorer farmers and gradually possess the land. Now, if religious people turn out to be better farmers than irreligious people, then religious people will eventually come into possession of the land. But if, on the other hand, irreligious people should turn out to be the better farmers, then irreligious people will eventually possess the land and the country churches will die a natural death.

Again, it is the experience of organizers of rural interests in every country that the great obstacle is the lack of a neighborhood spirit and mutual good will. Wherever this spirit exists organization is easy. Wherever it is lacking and mutual suspicion and antipathy exist in its stead, there organization is difficult. In this connection one may be justified in asking: *If the church does not promote neighborly feeling and mutual good will, what does it exist for?*

One of the impressive things about the rural organizations of such countries as Ireland, Belgium, Holland, Italy, Germany, and Denmark is the active part which the local priest or parson has played. It is quite the common thing to find that the priest or parson is the president of the co-operative society, while the schoolmaster is its secretary and business manager. This, however, is partly due to the fact that these two men are frequently the only educated men and generally the best educated men in the community. Such is seldom the case in this country. In any prosperous farming community it will frequently, if not generally, be found that there are farmers who are better educated than the priest, parson, or school-teacher, besides having much more practical business experience. Where this is true it is better, of course, to leave the practical administration of affairs to these farmers. Nevertheless, the inspirational work of the church might well be directed toward the creation of such a neighborly spirit and mutual good will as would enable the whole community to work together easily and amicably. And in those communities where the country preacher is the best educated man and where he has or can obtain information as to methods of organization, there can be no objection to his assuming leadership in the organization of the community.

In closing it can not be emphasized too much that patriotism, like charity, begins at home—that is, in the neighborhood. Neighborhood loyalty, willingness to sacrifice if need be, for the good of the neighborhood, is just as important as national loyalty and willingness to sacrifice in the interest of the nation. No nation can be strong, prosperous, or progressive which does not command the loyalty and support of its citizens. Neither can a neighborhood. It is as true of a neighborhood as of a nation that "a house divided against itself shall not stand."

SUGGESTED READINGS FOR THE VARIOUS COMMITTEES.

Each committee is strongly advised to correspond with its own State college and with the United States Department of Agriculture, asking for specific information and for suggestions for further reading. A list of publications which may be helpful will be furnished upon application to the Office of Markets and Rural Organization.

CLEAN WATER AND HOW TO GET IT ON THE FARM.

By Robert W. Trullinger,
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THE improvement of farm water supplies, a matter long neglected by American farmers, is now in some degree attracting the consideration it merits. It is becoming widely recognized that in many cases the farm water supplies are perhaps dangerously polluted. In addition, those who are so unfortunately situated as to be required to carry water from the well to the house are becoming extremely weary of this drudgery. Every farm must have a water supply, *and it is safe to say that a plentiful supply* of clean water, made available where most used by the mere turning of a faucet, or at the worst by pumping without carrying, is one of the main factors in making modern farm home life desirable.

Securing clean water in the farm house is a somewhat different problem from that of providing a city or town supply. In the latter case the purity and availability of the water supply is taken care of by engineering and public-health officials; in the former a personal understanding of the dangers which lie in a polluted water supply is necessary, and a great deal of resourcefulness is often required to secure an unpolluted supply and to prevent the drudgery of carrying water.

THE DIFFERENCE BETWEEN CLEAN WATER AND MERELY CLEAR WATER.

Perhaps the most important consideration in connection with the farm water supply is to get clean water. In the past clean water has usually meant clear water. But it is now known that water to be clean must not only be clear, but it must be pure. Water may be vilely polluted and at the same time be beautifully clear and sparkling. It may be clear and yet contain the invisible and deadly germs of typhoid fever or other intestinal disorders. It

may also contain considerable poisonous matter in solution. A polluted water supply is evidence of the existence of bad sanitary conditions which it is of the utmost importance to remedy.

The main sources of water for farm use are streams, springs, cisterns, and wells. Perhaps the majority of supplies are derived from wells and cisterns, although springs are often used. In rarer instances, where other supplies are difficult to obtain, stream water is used.

STREAM WATER UNSAFE TO USE.

With the growth of population and development of industries there is progressive pollution of streams, so that in the more thickly settled regions streams not already contaminated or subject to pollution are very rare. Surface-water supplies from small streams should, therefore, never be used for household purposes unless no other supply is available. In the event that it must be used such water should be clear and should be thoroughly boiled. Other processes of purification, such as filtering, treating with chemicals, or distilling, are also sometimes used, but are generally impracticable from the farm standpoint. Under ordinary conditions surface water of any kind should be looked upon with considerable suspicion.

THE FARM WELL.

The well is the most commonly used source of farm water supply. It may be a shallow dug or driven well or a deep dug or bored well. It may be said, however, that the majority of shallow dug wells on farms where contamination is present are contaminated. This has been abundantly proved by investigations made by this department and by other Federal and State institutions. The State of Illinois has made rather extended surveys of its farm water supplies, and the report of these surveys shows that out of a large number of typical shallow wells examined three-fourths were dangerously polluted. The boards of health of Indiana, Minnesota, Missouri, North Carolina, Virginia, and other States have published official statements no less startling. In a large number of cases it is stated that pol-

lution might have been prevented by proper precautionary measures.

Contaminated water is, however, by no means confined to shallow wells. Contaminated surface water often gains access to deep wells at the top in the same manner that it gains access to shallow wells. Poorly protected shallow wells are sometimes polluted through the soil, although this does not occur as often as is commonly thought. Deep wells, if not cased, may be likewise polluted through the soil or through rock fissures, and if cased, surface water may follow the casing to the bottom and thus enter the well. However, deep wells are as a rule less likely to be polluted than are shallow wells.

A more vivid impression of common causes of unclean farm wells can perhaps be gained from the accompanying illustrations. These represent existing conditions, most of which were photographed by the writer.

Plate VII, figure 1, shows the back yard of a local health officer in a farming community. The rather small area shown comprised a hogpen, chicken yard, and cow lot, and contained a barn, manure pile, open privy, chicken house, and shallow dug well. The pump is of the old wooden type and is located at the foot of the stairs to the back porch. Waste water and slops are dumped into a small ditch presumably intended to drain away from the house and well, but which as a matter of fact fails to drain at all.

The open well shown in Plate VII, figure 2, is located much lower than, and within 25 feet of, the barn and chicken yard. The well in Plate VII, figure 3, contained water dogs, and in fact any small animal could crawl under the loose curbing and fall into the well. Plate VII, figure 4, represents a back yard as photographed by the Indiana State Board of Health. An examination of the water from the well showed it to be dangerously polluted. Plate VII, figure 5, shows an open well with old-fashioned wooden curb, pulley, and buckets which is subject to surface wash from several sources of pollution. The well is a shallow well about 15 feet deep, loosely lined with stones. An inspection of the inside revealed moss and slime hanging down into the water, probably resulting from surface wash.

The soil in which a well is sunk may more or less affect the extent to which it is polluted. Often a shallow well in a tough clay or hardpan soil which extends to the water-bearing stratum is fairly safe from pollution if protected at the surface. Deep wells in very sandy soils, if protected at the top, are not often polluted. Perhaps the most dangerous wells are those in a limestone region. The limestone often contains open underground passages or channels. These channels frequently lead to open fissures or sinks at the surface, into which filth, sewage, garbage, and other contaminating matter is dumped. Rain water can carry these impurities directly to wells through the channels.

HOW TO KEEP THE WELL WATER CLEAN.

PRELIMINARY MEASURES.

Obviously the logical first step in securing a clean well-water supply is to remove all the sources of possible contamination. Among the worst of these are the open privy vault, the leaching cesspool, and barnyard filth. A well in ordinary pervious soil located lower than, and within 100 feet of, any of these is almost certain to be polluted. Even though the well is located on higher ground than these sources of contamination, heavy pumping or dry weather may so lower the ground-water level that it will reach the zone of contamination and thus pollute the well. It is evident, therefore, that the open privy vault and leaching cesspool should be discarded and a sewage purification system, or at least a sanitary privy, be used instead. Sewage, garbage, manure, or other waste should never be dumped into sinks or fissures, and most certainly never into old abandoned wells. An old well used for this purpose is very likely to communicate directly with the water-bearing stratum from which other wells in the immediate vicinity draw their supply. Slops or waste water should never be thrown out of the back door or window onto the ground. If the pigs and chickens must run at large they should at least be kept away from the well. A box built around the pump and filled with manure in winter is an extremely unsafe way to prevent the pump from freezing.

Concrete manure pits, impervious floors, and water-tight drains are desirable features for farm buildings. If these are beyond the farmer's purse the manure pile should at least be placed a safe distance away from the well.

The well itself should be located as high as possible with respect to buildings, stock pens, and chicken yards, and as far away from all sources of contamination as convenience and local surroundings will permit.

FINAL MEASURES.

The final safeguards to a well-water supply are to give the well an impervious lining of tile, cemented brick, iron casing, or concrete, and to provide a water-tight curb, not only to keep out surface wash, animals, and vermin, but to prevent the pump drip and dirt from shoes and buckets from entering the well. It is well here to suggest that those who use the well should attempt to remove the most of the dirt from their shoes before stepping onto the well curb.

Plate VIII, figure 1, shows a well-protected dug well. It is located on high ground and has an impervious lining of 30-inch vitrified tile with tightly cemented joints. The top tile extends a foot above the ground and is capped with concrete. The barns, pens, etc., are located at a safe distance and on lower ground, the farmer preferring to pipe or carry the water to these places.

Concrete makes a good lining for a dug well, owing to the fact that if a mixture of mushy consistency is used an almost water-tight bond can be effected between the soil and the concrete, thus preventing in a measure the entrance of surface water to the well by this route. A concrete well curb, as shown in Plate VIII, figure 2, can always be used with advantage. Concrete drains to carry away the pump drip and surface wash, as shown in Plate VIII, figure 4, are desirable. Note the clean-looking surroundings of this well.

Deep wells are usually lined with smaller tile or with iron casing. Small tile casings, however, where the joints are not cemented, allow contaminated surface and soil water to enter the well. The iron casing is more frequently used in deep bored or punched wells of smaller diameter, being ually driven into place. With such a casing the well can polluted only at the bottom.

Ordinarily for shallow water supplies a driven well is safest and the most satisfactory, particularly if the soil is sandy. It consists mainly of a point and screen attached to a pipe which is driven until the water-bearing stratum is encountered. The screen on the point prevents coarse matter from being pumped up.

From what has been said regarding wells it may be concluded that the watchword should be "Keep the surroundings clean and protect the well from surface wash and soil drainage." For further safety it is a good idea to have the water tested occasionally for signs of pollution.

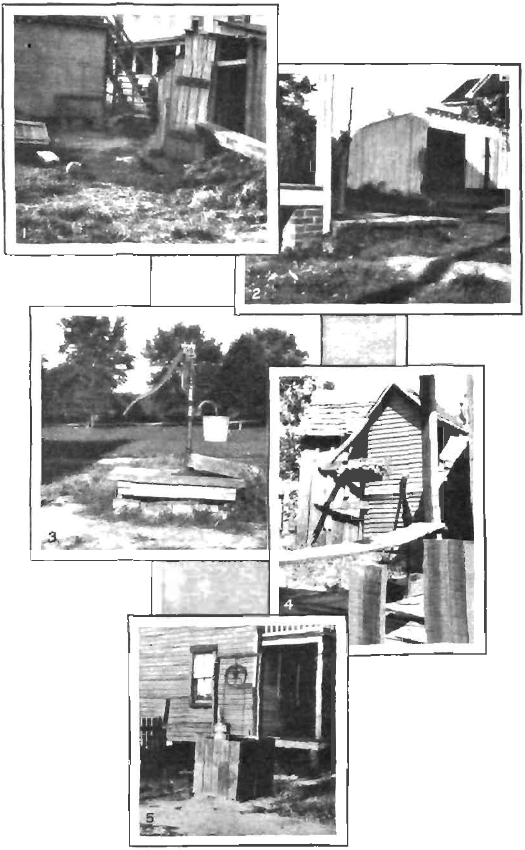
HOW SPRINGS ARE POLLUTED AND HOW TO KEEP THEM CLEAN.

The farmer who has a good spring which can be piped to the house is fortunate indeed. Springs are, however, subject to contamination from the same sources as wells, although more often contaminated by surface wash and because animals have access to them.

The water from springs which are open and unprotected from surface wash and from stock is often used for drinking purposes. Plate IX, figure 1, shows a spring the water from which is commonly used for drinking, especially by picnickers and wayfarers. This spring, as can be seen, is located directly under a very popular roadway, and although walled in, has inadequate protection from the filth which during rains will wash from the roadway. Plate VIII, figure 3, is a historic farm spring which is carefully walled in but forms an excellent catch basin for the surface wash from the surrounding hog-pens, chicken yards, barns, etc., located on higher ground.

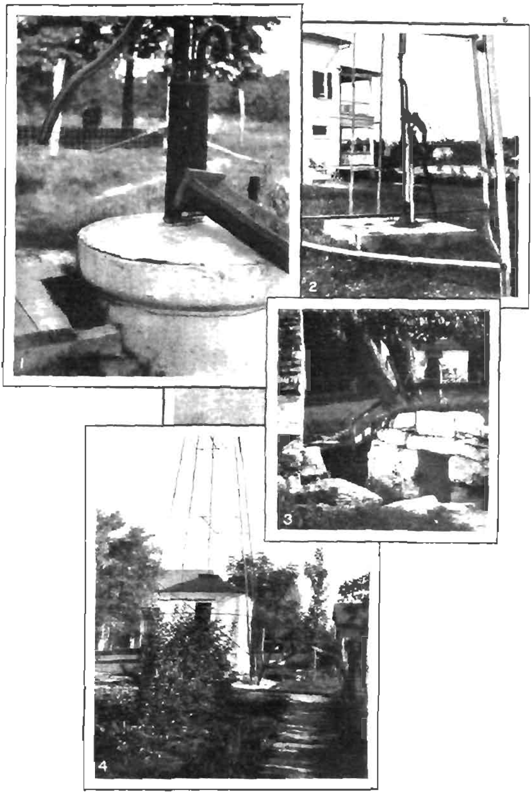
The proper location for a spring is the same as for a well. If it occurs in a good location it should first be fenced off from stock and then walled in with tile or concrete to form a reservoir, which should be well covered.

Plate IX, figure 4, is an example of a well-protected small spring which is located just above the foot of a hill. A 36-inch vitrified tile was placed around the spring so as to form a reservoir, and it was then covered as is shown. Owing to the location and manner of protection there is little chance for this spring to become polluted from surface wash. Small



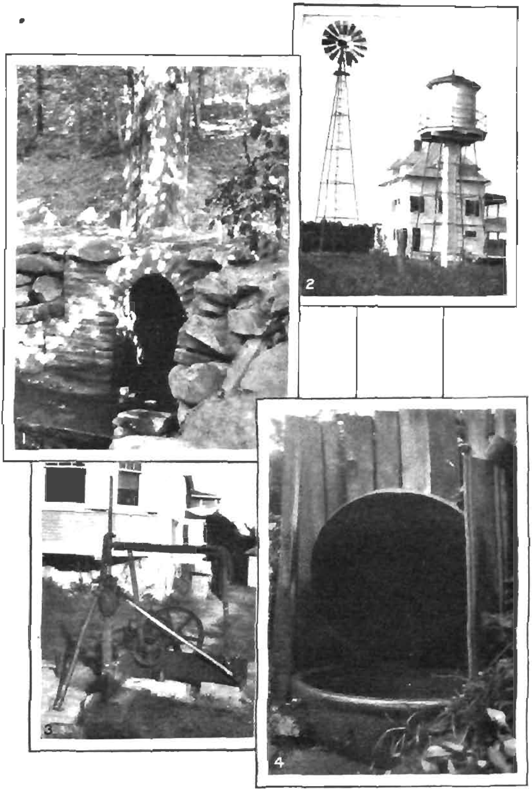
SOME TYPES OF WELL SURROUNDINGS.

Fig. 1.—The backyard of a local health officer's residence. Fig. 2.—A well which the surface wash from the barn during rains will pollute. Fig. 3.—A loose curbing which permits small animals and vermin to fall into the well. Fig. 4.—Well in which the water was badly polluted. Fig. 5.—An old-fashioned open well subject to surface wash.



SOME TYPES OF WELL AND SPRING SURROUNDINGS.

FIG. 1.—A good protection for a dug well. FIG. 2.—Curb good and tight, with pump frame tightly fastened to it. FIG. 3.—Catch-basin type of spring, which one should usually avoid, regardless of its history or popularity. FIG. 4.—A nicely kept well with concrete drains and clean surroundings.



SOME TYPES OF WELL AND SPRING SURROUNDINGS.

Fig. 1.—Spring inadequately protected from surface wash from the road; should be looked on with suspicion. Fig. 2.—An excellent outside elevated tank system. Fig. 3.—Small gas engine directly connected to the pump. Fig. 4.—Spring well protected, and can be tightly covered.

springs can frequently be protected in this way, and if so treated are often the best of water supplies.

Springs, especially those occurring in limestone regions, should be kept under close observation and should be particularly noticed after rains for any signs of turbidity, which may indicate pollution from near or distant surface sources. Frequent examinations for pollution may prevent trouble, and if there is any doubt whatever about the purity of the spring, the water should be boiled carefully before drinking.

RAIN WATER AND CISTERNS.

In many cases rain water is used for laundry purposes and sometimes for drinking and cooking. It is often the only available source of soft water. If rain water is to be used, a cistern for storage purposes and usually a filter for partially purifying the water are necessary.

Roofs, particularly shingled roofs, collect much dust and dirt from the roads, and gutters and eave troughs are often filled with leaves, dirt, and bird droppings. It is well to keep the gutters clean, even though the rain water is not used, but if it is used the importance of clean gutters is vastly increased. However careful one may be, the roof is certain to be dirty when dry. It is therefore extremely important that a switch and by-pass be provided on the rain-water pipe, so that at the beginning of rains the filth from the roof may be washed to the outside before any rain water is admitted to the cistern.

The necessary size of the cistern will depend on the amount of water used daily by the family, the annual rainfall in the locality, and the size of the contributing roof area. If the rainfall is well distributed throughout the year, the capacity of the cistern may be only sufficient for one or two weeks' supply. In localities where long intervals often occur between periods of rainfall, and where much dependence is placed on the rain water, it is advisable to provide a cistern of sufficient capacity to hold half or three-fourths of the rain which falls annually on the average roof area. The amount available in gallons may be computed approximately by multiplying the roof area in square inches by the rainfall in inches and dividing the product by 231. To take greater

advantage of rains, the contributing roof area may be extended by means of proper piping to include roofs of other buildings besides the house.

The cistern may be built of concrete or cemented brick, but in any event if placed underground it should be water-tight, not only to prevent the loss of the stored water, but to prevent the entrance of ground water. If the cistern is constructed of concrete and the surrounding soil is loose and exerts a decided pressure on the walls, the latter should be reinforced close to the inside surface. A mixture of 1 part cement, 2 parts sand, and 4 parts gravel or broken stone may be used in cistern construction. The concrete mixture may be made more waterproof by adding 10 per cent of petroleum residuum oil based on the weight of the cement, or by replacing about 15 per cent of the cement with hydrated lime. Whatever the type of construction, one or two coatings of a strong cement grout, preferably containing about 3 per cent oil, will aid in waterproofing the walls. An overflow pipe, well screened, should be provided in the side, and the cover should be water-tight.

The filtering arrangement may either be in a separate chamber or inside the cistern.

In the first case, a filter bed of sand and gravel is placed in a brick or concrete tank or in a good barrel located preferably close to the cistern. The rain water should be made to spread over the surface of the filter and come in contact with all parts of it, passing completely through before entering the cistern. Figure 3 shows a common type of filter connected with an underground concrete cistern. Such a filter should, in a large measure, purify rain water which passes through it. The filtering material should be renewed at intervals and the collected sediment cleaned out frequently. The cistern shown has a capacity of about 3,800 gallons.

In the second case, the filter usually consists of two walls of brick, 8 to 10 inches apart, the intervening space being filled with coarse sand, fine gravel, or both. Only the vertical joints between the bricks are cemented. A number of loose bricks are placed at several points at the base to permit the removal of the sand or gravel when it becomes clogged. The filter wall should be built in an arch shape to give

strength. The raw-water compartment should be made much larger than the filtered-water compartment to obtain the benefit of sedimentation before filtration.

Sometimes the filter wall in a cistern consists merely of a wall of porous brick with vertical cemented joints. This type of filter is apt to become clogged and ineffective in time, as far as purification is concerned.

In some localities it is necessary, owing to the height of ground-water level, to build the cistern above ground. In

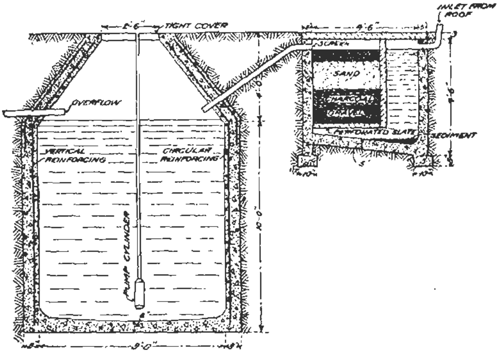


FIG. 3.—A common type of cistern and filter.

such cases the cistern should be well protected to prevent the entrance of filth and the breeding of mosquitoes.

The method of having the filter separate from the cistern, although usually the more expensive, is perhaps the more efficient. There are other simpler and perhaps less expensive cistern arrangements which serve the purpose. The main idea is, however, to purify the water as much as possible before it is used, and to provide effective storage.

HOW TO GET RUNNING WATER IN THE HOUSE.

From the standpoint of convenience, comfort, and refinement, the most important consideration in connection with the farm water-supply problem is to have the water under

pressure in an elevated tank or in a hydropneumatic tank and available at the turning of a faucet, or at least available by merely pumping.

The method of hoisting water from the well or spring, pouring it into buckets, and carrying it up porch steps and through doors into the kitchen and to other parts of the house is tiresome and wasteful of energy, and is cruelly and in most cases inexcusably primitive, especially as the task of obtaining the water generally falls in such cases upon the women of the household.

It is desirable, therefore, that running water be available at least in the kitchen, and in a bathroom if possible.

THE SIMPLEST WAY.

Almost any system of obtaining running water in the kitchen is better than none at all. If the well or cistern is located within a short distance of the house, about the simplest and perhaps the cheapest method is to place a pitcher or other pump over a sink in the kitchen. The suction pipe of the pump may be extended to the well and water be obtained when desired merely by pumping; that is, provided the distance to water in the well is not too great. Under ordinary circumstances a pump will lift water only to a height of about 20 feet. One should be careful, therefore, not to place the pump in such a position that the suction lift will exceed 20 feet, for in that event the pump will not operate satisfactorily and likely not at all. It should also be remembered that water flowing through a pipe meets with considerable resistance due to friction, which increases as the velocity of the water and the length of the pipe increase and as the diameter of the pipe decreases. Elbows and bends in the pipe also increase the friction. Pump manufacturers give information in regard to this frictional loss which should always be considered in arranging a pumping system in the kitchen or elsewhere. The allowable distance from the well to the pump for this arrangement will vary with local conditions. The writer has seen cases in which this distance was as high as 150 to 200 feet.

When the housewife is unusually busy in the kitchen it is a waste of time and energy, and perhaps a strain on patience,

to stop to pump water. Also the most water is usually needed when she is the busiest. For this reason a water supply under pressure is a great convenience, as it makes it possible to obtain the needed water merely by turning a faucet.

The simplest, and usually the cheapest, method of securing a water supply under pressure is to have an elevated supply tank located at some point 8 or 10 feet higher than the highest faucet.

THE ELEVATED-TANK SYSTEM.

An elevated water-supply tank may be placed in the attic, on the roof, on the windmill tower, on a special tower, or on the silo. It must be high enough to give the desired pressure at points where the water is used. The tank may be of wood or galvanized metal. Its size will depend on the amount of water used daily in the house. A 250 to 500 gallon tank is sufficient for the average family, although some have a much larger tank, so that a supply sufficient to last several days may be maintained. A larger tank is also necessary where water is supplied to the house and barns.

The simplest system of this kind is one with the tank in the attic or on the roof supplying water to the kitchen only. When the expense can be afforded a hot-water tank may be placed in the kitchen and the water plumbing be extended to a bathroom.

The pump for this system must be a force pump, which not only raises water to its own level by suction but forces it to greater heights, according to the power applied. The pump may be placed over the well or in any other convenient spot as long as the suction lift does not exceed 20 feet. A three-way valve on such a pump permits the operator to direct the water to the tank or through the pump spout, as desired. The pump may be operated by hand, but where much water is to be pumped to a considerable height a windmill, a small gas engine, or an electric motor will save much time and exertion.

Plate IX, figure 2, shows an excellent outside elevated-tank system supplied by a steel windmill. This tank is of about 2,500 gallons capacity and supplies water to the house

and barns. It is often possible to supply such a tank with a small gas-engine pumping plant, which may be situated in a shed constructed around the foot of the tower.

The great objection to an elevated-tank system is that in the colder climates there is danger of the water in the tank freezing. This is particularly objectionable when the tank is located in the attic, where considerable damage may be caused if it should burst. It is also necessary to provide an especially strong support for the tank. Another objection is that if located in the attic the tank is likely to catch considerable filth. It should, in such cases, be easily accessible for more or less frequent cleaning. It is well also to cover the tank to prevent, as far as possible, the entrance of dirt and vermin, and when placed on a tower outside it should be covered to prevent the breeding of mosquitoes.

The great advantages of this system are its cheapness and simplicity. All that is needed are a force pump, a storage tank, a pipe from the pump to the tank, a pipe from the tank to the point at which water is used, and accompanying fixtures. The tank should have an overflow pipe, particularly if located in the attic.

A number of such systems are in successful use. If well constructed and maintained, they afford a satisfactory, convenient, and comparatively cheap farm water supply. Although more generally successful in the warmer climates, such systems may with proper protection and attention be often used with success in colder climates.

An improvement over the elevated-tank system is the hydropneumatic system, which does away with the dangers of freezing and filth accumulation.

THE HYDROPNEUMATIC SYSTEM.

In the hydropneumatic system a water and air tight tank is placed in the basement or almost anywhere in the immediate vicinity of the house where there is no danger from freezing. This tank is usually connected by a 1¼-inch pipe to the three-way valve of a force pump for the well or cistern. The pump preferably is so equipped as to pump a little air at each stroke in addition to the water. At the start of pumping the tank is full of air, but as pumping continues this air

is gradually compressed by the entering water until the required pressure, usually 25 to 40 pounds, is indicated on a pressure gauge.

One pound of pressure will force the water approximately 2 feet high in the house, so that for the ordinary house a pressure greater than 40 pounds is not necessary.

For the average family a tank at least 30 inches in diameter and 6 feet long, with a capacity of 220 gallons, is required. At 40 pounds' pressure this tank will be nearly three-fourths full of water and will deliver about 130 gallons to the second story and a greater proportion of the total capacity to the kitchen. Tanks of larger or smaller capacity may be secured if desired.

Figure 4 shows the main features in the installation of such a system with the tank in the house basement. The hot-water pipes are shown in black. The pump may be over the well as shown, or in the cellar next to the tank if the well is not too deep nor too far from the house.

The equipment necessary for an installation of this kind consists of a steel tank of the desired size, with pressure gauge and gauge glass, an air and water force pump, pipes, and connections, a 30 to 40 gallon hot-water tank, and the desired fixtures. A system of this kind, if well installed, affords a satisfactory and convenient water supply available at the turning of a faucet. It is perhaps more expensive than the elevated-tank system, but also does not have many of the objectionable features connected with that system. Water may be pumped for this system by hand, but, as in the elevated-tank system, where the desired pressure is above 20 to 25 pounds, a windmill, small gas engine, or small electric motor is necessary.

POWER FOR PUMPING.

A gas engine rated at from ½ to 1¼ horsepower should be of sufficient power for ordinary farm pumping. It may be connected with the pump directly or by a belt.

In the first case, the engine is usually used for pumping only and may be arranged about as shown in Plate IX, figure 3. It is usually desirable in such a case to provide a shelter for the engine, at least.

In the second case the engine is more likely used for several purposes about the farm and may be a portable engine, or it may be located in a shed near the pump. In either event, if the pump is equipped with a pumping jack and belt wheel it may be operated by the engine by means of a belt.

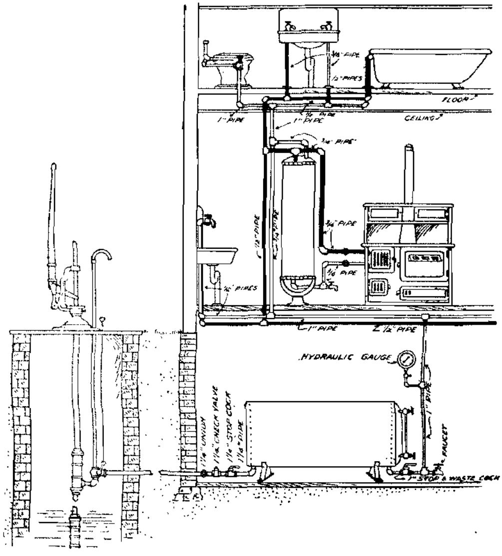


FIG. 1.—Pneumatic tank supply system with tank in basement supplied by hand force pump.

A good windmill is a cheap source of pumping power if well taken care of. A steel windmill is usually preferable to the wooden type. The mill itself costs considerable, it is true, but wind power thereafter costs nothing, while gasoline is a constant expense. The gas engine will, on the other hand, pump water whether the wind blows or not. On the whole, however, in localities where the wind is steadily fairly strong a windmill should be a satisfactory pumping power. Where

electricity is available an electric motor rated at ⅙ to ⅟ horsepower is usually sufficient for ordinary farm pumping.

If spring water is used the hydraulic ram is usually the best method of pumping water to the house if the spring is so located that the water can not be piped directly by gravity.

THE HYDRAULIC RAM.

The hydraulic ram is a simple, though rather wasteful, machine which utilizes the momentum of a stream of water falling a small height to elevate a small part of that water to a greater height. In this way a spring if properly connected

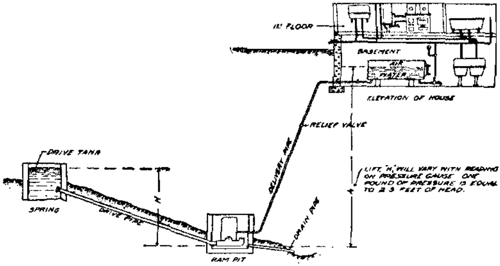


FIG. 5.—Hydraulic ram pumping to a pneumatic tank supply system, showing usual relative positions of spring, ram, and storage tank.

with a hydraulic ram will do double duty, supplying the water and also the power for pumping.

Certain conditions are necessary, however, for the proper operation of such a system. The ram must be located lower than the spring and at the proper distance away. The fall from spring to ram must not be less than 2 feet, and the spring must supply not less than one-half gallon of water per minute. Most rams are, however, guaranteed to operate on not less than 2 gallons per minute. Figure 5 shows the usual relative positions of spring, ram, and storage tank.

The drive pipe is usually twice the size of the delivery pipe and the size of each depends on the size of the ram used. The length of the drive pipe is usually about seven times the height of fall, although this may vary between five and ten, depending on the height and distance to which water is to be

delivered. Its length must ordinarily be equal to the vertical height to which the water is lifted and must never be less than three-fourths this height. It is well to add on the average about 2 feet to the length of the drive pipe for every 100 feet the water is carried horizontally.

Where the grade is small and it is therefore necessary to bring the water a long distance in order to get the desired fall a standpipe or reservoir may be placed in the line of the supply pipe at the proper distance from the ram, as shown in figure 6, and thus bring the effective pressure nearer the ram and prevent waste of pressure by friction in an unnecessarily long drive pipe.

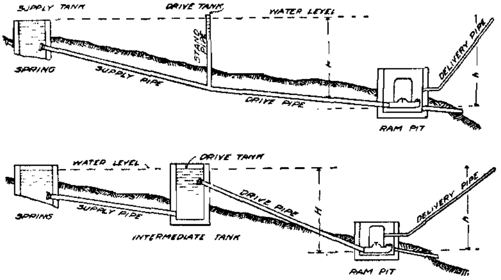


FIG. 6.—Two methods of securing the necessary fall in drive pipe.

Manufacturers of hydraulic rams make certain guarantees as to what their particular type of ram will accomplish under certain conditions. If one knows the quantity of flow of his spring, the elevation above the spring to which it is desired to deliver water, and the distance from the approximate location of the ram to the point of delivery, he can, by consulting the tables which manufacturers usually furnish, easily determine the size of ram, length and size of drive pipe, and usually the minimum permissible fall in the drive pipe to suit his particular case. Thus the smallest sizes of some makes of hydraulic ram are guaranteed to operate under a minimum fall of 3 feet with a supply of 2 to 3 gallons of water per minute and lift 10 to 15 gallons of water per hour to a height of about 20 feet. The larger sizes will deliver 150

to 300 gallons per hour to a height of 100 to 120 feet under proper working conditions. The proportion of water supplied to the ram which is elevated to the point of use will vary according to operating conditions from about two-sevenths for the lower lifts to one-twentieth for the higher lifts. In order to secure their guarantee it is well to follow closely the directions for installation given out by the manufacturers of the ram.

It is always well to house the ram in to protect it from freezing and to prevent the entrance of sand and grit to the drive pipe by screening the open end. Sand and grit will soon prevent the proper action of the valves. The pipes should also be placed below the frost line. In setting a ram the foundation should be firm and level. The drive pipe should be laid on a perfectly straight incline without bends or curves except where the pipe enters the ram, and this should be made by bending the pipe. Fittings should be used only where absolutely necessary. The upper end of the drive pipe should be sufficiently below the surface of the water to prevent air suction—at least a foot. Above all things the drive pipe should be air-tight.

The delivery pipe may be laid with the necessary bends, according to the usual practice in laying water pipes, but all pipes should be connected before starting the ram and they should be left uncovered until all leaks are stopped. There should be as few bends and elbows in the delivery pipe as possible in order to reduce friction.

Taken as a whole, the hydraulic-ram pumping system is a very convenient one. Of course it requires a certain amount of watching and care, but the ram is so simple that if properly installed it is easily kept in working order. It operates day and night, winter and summer, whether the wind blows or not, and regardless of the price of gasoline or electricity, and its operation is continuous until stopped. In some respects, therefore, it has the advantage over the windmill and gas engine.

CONCLUSION.

Methods for safeguarding the purity of farm water supplies are being given more and more attention by progressive farmers, and the value of clean water from the standpoint of

health is now recognized. The rural inhabitant, therefore, realizing his obligation to his family and to himself in this respect, should see to it that clean and wholesome water is provided for household uses. This necessitates in the main the use of effective measures for protecting wells, springs, and other sources of farm water supplies from surface and subsurface pollution and that, above all things else, clean well surroundings be maintained. Further, to avoid trouble in the future, a spirit of constant watchfulness and care with reference to maintaining the purity of the water supply may well be developed.

In addition, simple, economical, and practical means of obtaining running water in the house have been found which, when properly and carefully installed, do away with much of the drudgery formerly borne largely by the farm housewife.

The farmer of average means can not afford to overlook the advantages offered by these more modern methods and arrangements for securing running water in the house; and when the expenditure in time and energy for carrying water is compared with the actual cost of installing the cheaper and simpler means of providing a convenient water supply in the house, it is believed a step in this direction by even the less well-to-do farmer would be, in the long run, a decided saving and advantage.

STORY OF THE THERMOMETER AND ITS USES IN AGRICULTURE.

By Alfred H. Thiessen,
Section Director, Weather Bureau.

THAT common but useful little instrument, the thermometer, may be employed in various ways on the farm to the farmer's benefit. It will give exact information regarding temperature, which is important to the farmer, and thereby increase exact methods on the farm at little cost. In all departments of industry exact methods are superseding inexact methods, and the accurate ways of the manufacturer or the city merchant are as applicable to the operations on the farm as to the factory or store.

IMPORTANCE OF KNOWING THE TEMPERATURE.

How much depends on the temperature! It is the most important element of the weather for us to know accurately. Our comfort depends more upon how the thermometer stands than upon any other single factor. Chemical changes are going on about us at all times, and, as a rule, take place more rapidly the warmer substances are. Note, for instance, the rapid rotting of fruit, the souring of milk, and decomposition in general when temperatures are high. Note the health and vigor one has in cool, crisp weather. Cold air has a tonic effect, and all should learn the right temperature of the air for work, study, or play to get the most out of all three.

THE THERMOMETER.

Let us examine the thermometer, learn how it was developed, and how it is made. We shall then become better acquainted with it, and handle and use it with greater assurance; afterwards we shall show how it may be used on the farm.

EARLY HISTORY.

The earliest form of a "heat measure," which is a literal translation of the Greek word "thermometer," was made about 1592 by Galileo and was an air thermometer (see fig 7).

It consisted of a glass tube *B* opening into a glass globe *A*. Some water was first poured into the globe, and the tube was then inverted with its open end submerged in a vessel of water, as shown in the figure. This instrument was not constructed for the purpose of showing exact degrees of heat, but was used by physicians (Sanctorius, about 1624) to indicate the higher temperature of fever patients over that of persons in normal health. The operation of the instrument is as follows: When the bulb is grasped, the top of the liquid at *D* is depressed, and the more according to the intensity of the fever. The warmth of the hand is communicated to the air in the bulb, which, expanding, forces the liquid out of the tube *B* into the vessel *C*.

This first form of a thermometer has the great objection in that it is not easily handled, and that it is subject to changes due to differences in air pressure which are constantly occurring, and to the diminishing volume of water due to evaporation.

The next important form in the evolution of the thermometer is shown in figure 8. It is like the thermometer in present use, except that the stem is open at the top. This form has a great advantage over the first form in that it is less affected by air pressure, but, of course, has other decided defects.

The first thermometer was made by Galileo in 1592; he and his students and others improved upon his first two forms, shown in figures 7 and 8, until finally, in 1641, the instrument used by the Florentines had attained a form in all its essentials like the modern thermometer (see. fig. 9).

PRINCIPLE OF THE THERMOMETER.

All ordinary thermometers work upon the principle of the expansion of substances with heat, and gases, liquids, or solids may be used. In the ordinary instruments, accurately described as liquid-in-glass thermometers, the differences of heat indicated depend upon the condition that the glass container and the liquid used expand differently with the application of the same amount of heat to both. If glass expanded with heat and contracted with cold to the same degree as the liquid, then the latter would always

stay at the same level, no matter how the temperature changed. Glass, however, expands to a lesser degree than do the liquids used; hence the fall of the liquid column when the air becomes cooler and the rise when warmer.

MAKING A THERMOMETER.

The best of the earliest thermometers were made by expert glass blowers of Florence, Italy, and were much

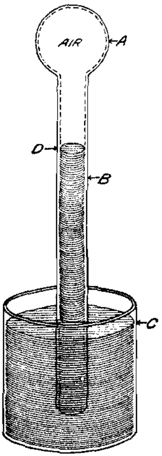


FIG. 7.

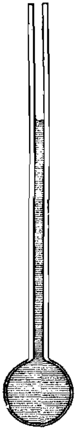


FIG. 8.

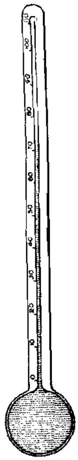


FIG. 9.

superior to those made in England, where unsealed thermometers, or those similar to figure 8, were in common use previous to 1740, when they were replaced by the Fahrenheit instrument.

The making of the best modern thermometers is an interesting process. The glass is specially selected and blown by an expert workman, who first makes the tube and, after examining its bore to determine its size, attaches the bulb. The determination of the size of the bore is very necessary, as the size of the bulb must bear a certain relation to it.

The tubes are then filled with a thermometric substance, usually mercury or alcohol, both of which must be chemically pure. After the thermometers are filled and sealed, they are laid away to season; for it has been found that glass, after being subject to high temperatures, shrinks somewhat. The shrinking process continues about two years, although most of it takes place in one year. After the seasoning process they are ready to receive the degree marks.

SOME FACTS REGARDING THERMOMETERS.

There are four essential parts to a thermometer—tube, bulb, liquid, and scale.

The tube should have as uniform a bore as possible; otherwise the degree marks would not indicate the correct temperatures, except at the test points.

The size of the bulb should bear a certain fixed relation to that of the tube, and must be large enough to produce a scale of sufficient size. To illustrate this: Suppose we consider two thermometers with bulbs of different sizes, but with tubes of the same size. It is evident that when subjecting both thermometers to the same additional amount of heat the mercury will rise higher in the tube having the larger bulb. The workman makes his bulb of such size as will fit the stem. A good length of thermometer for ordinary use is 10 or 12 inches.

The selection of a suitable liquid is very important. Either mercury or alcohol is generally used. It may be observed that the liquid in some thermometers is wine color; in such cases the liquid used is alcohol colored with a dye, which after long use may settle to the bulb end, leaving the top of the column quite colorless. The essentials in the choice of liquids are that the expansion of the liquid be much greater than glass, that it shall not distil in the upper part of the stem, that its surface tension be small, and that it shall have low specific gravity.

THE THERMOMETER SCALE.

In the construction of a thermometer the scale is made last and after the seasoning process. In the best thermometers the scale is etched on the glass stem; for if a separate

metal scale is used errors may occur by the slipping of the metal scale in reference to the glass stem. There are three scales in common use: the Fahrenheit, the centigrade, and the Réaumur. The freezing point on the Fahrenheit scale is at 32° and boiling point at 212°; there are, then, 180 whole steps between freezing and the boiling point on this scale. A scale of 100 parts was invented by Celsius, but the order of numeration, 0–100, which is the present centigrade scale, was adopted and recommended by another; its zero is at the freezing point, and the boiling point is marked 100°. The third scale, that of Réaumur, has its freezing point at 0° and the boiling point at 80°.

The centigrade scale is used the world over for scientific purposes. The Réaumur is still employed for domestic uses in several countries. The Fahrenheit scale is used quite generally by English-speaking people.

HOW TO EXPOSE A THERMOMETER.

Now that we understand to some extent the theory of thermometers and how they are made, let us turn our attention to how they should be exposed.

In the first place, no matter how exposed, a thermometer simply tells its own temperature. It will indicate the temperature of gases, liquids, and solids by being immersed in them, but with varying degrees of error, depending on how well the instrument is exposed and on other factors. In most cases a thermometer hung in the free air will not give the actual temperature of the air, because it is subject to the direct rays of the sun, and because radiation from the thermometer can take place unimpeded. Probably the best way to expose a thermometer in order to determine the temperature of the air is to hang it in a shelter so made that air may blow freely through it, and then whirl the instrument before a reading is taken. The same conditions may be obtained by rapidly whirling the thermometer in any outdoor shade. It is especially difficult to obtain the exact temperature of gases, even though their temperatures remain stationary. Another difficulty comes in when the temperature of the medium to be measured is constantly varying, as does that of the air.

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It is obvious that it will take a certain length of time before a thermometer will indicate the temperature of a medium to within a degree, and still longer to indicate the temperature to within a tenth, when the temperature of the medium is constant. When the temperature of the medium is continually changing, the thermometer seldom indicates the correct temperature; but it may be reasonably close, depending on the sensibility of the instrument, the exposure, and the rapidity with which the temperature is changing.

If exposed in the air the thermometer will endeavor to follow changes in the air temperature, but it can not record such changes instantly. The heavy line in figure 10 indi-

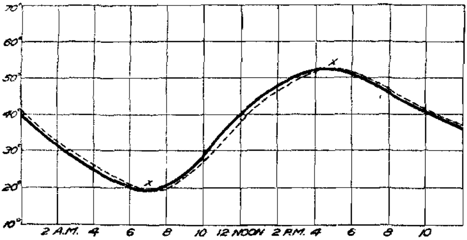

FIG. 10.

cates the real temperature of the air, the broken line the indication of the thermometer. It is seen that the thermometer is always lagging behind the air temperature, except that when the temperature changes abruptly there may be a crossing, as at X, when the thermometer indicates the temperature of the air at that instant.

Everyone has noticed the great difference between the temperatures of stones in the sun and others in the shade. Those in the sun seem much hotter than the air, while those in the shade seem much colder. Now, a thermometer, like the stones, is constantly receiving heat by radiation from surrounding objects and emitting heat by radiation from itself. The correct way, then, to measure the temperature of the air is to employ some means by which these radi-

ating effects may be overcome, and that is by hanging the thermometer in a shelter, as explained above.

USES OF THERMOMETER ON THE FARM.

In the farm home this instrument will often tell a very important story. In the first place, it should be exposed correctly. If placed on a wall, it is subject to all kinds of currents of air that may be rising or falling at that place, and may indicate something quite different than the average temperature of the room. When practicable it should be hung in the middle of the room, from the ceiling, about 4 or 5 feet from the floor. If one were to explore one's living room with a thermometer, many unlooked-for differences in temperature would be found. The air near the floor would be much cooler than that near the ceiling, and the temperature would also vary at the same level in the various parts of a room. In a sick room, where greater accuracy may be required, it may be necessary to hang the thermometer on a level with the patient's head.

Testing the bath water is another important use in the home, especially in the case of children or invalids. For a cool bath the water should be from 60° to 70°, tepid bath from 84° to 88°, a normal bath about 98°, and a hot bath should be over 100° F.

Knowledge of the temperature of the pantry and cellar is important, for by investigating them one may make improvements in conditions. Putrefaction will start at 50°, so that a pantry or closet where food is kept should have a temperature at least as low as that. Cellars where canned goods are stored should have a temperature of 32° or over. Apples are frequently stored in outside cellars, where the temperature should be kept at 31° or 32°; but apples may be kept satisfactorily at 34° or 36°. When stored at the higher temperatures, the fruit should be placed there soon after being picked.

CANDY MAKING AND COOKING.

A favorite pastime with the young women on the farm is candy making. There is no branch of cooking in which temperatures are more important than in making candy.

For this purpose special instruments are made. No one can follow a good recipe for any kind of candy and ignore the temperature.

Thermometers are also made so that the bulb may be permanently inserted in stove ovens and the scale read conveniently on the outside. With the use of such a thermometer the housewife may be sure of the temperature; and since cooking is a chemical process which quickens with the increase of heat, it is highly important for successful and uniform cooking to know and to have the oven at the right temperature.

IN THE DAIRY.

A thermometer should be the constant companion of the dairyman. There is probably no other department of the farm in which a thermometer can be used to greater advantage than in connection with dairy operations. The temperatures at which milk, cream, and butter are kept, and at which the various operations of butter making are carried on, are very important.

When milk is to be sold as such, it should be immediately cooled. The reason for this is to stop the increase of bacteria as much as possible. It has been found that an increase of 14° in the temperature of milk will increase the bacteria 600 per cent, and that bacteria will reproduce themselves every half hour if the temperatures are favorable.

If milk is to be separated by a centrifugal process, it should have a temperature of 90° or 92°, and should be separated preferably right after milking, and then cooled. If milk is to be separated by gravity methods, it should be cooled to 50° very soon after milking.

The temperature at which cream is churned is another important item, and success depends largely on this factor; 52° to 62° Fahrenheit is considered about right. And, lastly, butter should be stored in a cool place to insure its remaining sweet.

IN THE INCUBATOR.

The incubator is now frequently found on farms, and the importance of maintaining correct temperatures in them need not be emphasized. The correct temperature is 103°

and should not go lower than that, especially during the first six days. To insure almost absolute success, in so far as maintaining the correct temperature, one may use the electric alarm which rings a bell when the temperature reaches 105° or falls lower than 103°. This instrument will not only aid greatly in attaining success with the hatch, but also diminish the worry and attention.

OUTSIDE USES.

It is sometimes desirable before planting to test the temperature of the ground. The experience of every farmer has taught him that every species of seed has a minimum temperature below which it will not germinate. There also appears to be an upper limit. One may plant in too high a temperature, but success under this condition is dependable largely on the moisture content of the soil.

IN THE ORCHARD.

Much has been written regarding the uses of thermometers in the orchard at frost time, but they may be applied to all crops that are injured by early or late frosts, such as tomatoes and late onions. Some means of protection may be applied to them all.

The farmer should first know his farm. He should know what places are colder than others. He may not wish, nor is it necessary, to have a thermometer for every little hill and hollow, but he should by actual test find out the cold and the more favorable places. A knowledge of this kind will help the farmer not only in protecting his fruit and other crops, but also in planting. There should be a regular station somewhere convenient on the outside where a thermometer can be exposed. Knowing how other places on the farm compare with the regular station, the farmer may, by reading his station thermometer, estimate the temperature at any place on his land fairly accurately.

OCCASIONAL USES.

The clinical or fever thermometer may be found very useful on the farm. The condition of a patient may be the more intelligently reported by telephone or messenger to the

attending physician. The temperature of a person in normal health is 98.6°.

The following are the normal temperatures of farm animals: Swine, 104°; goats or sheep, 102° to 103°; cows, 101° to 102°; horses, 99° to 99.6°; dogs, 99° to 100°. A rise of one or two degrees is unimportant if temporary; but if permanent it indicates a serious condition which needs attention. A rise of 10° to 12° in animals is usually fatal. One may wish to report the temperature of a sick animal together with other symptoms to a veterinary, and the exact fever condition can only be obtained with the use of a good clinical thermometer, which should be used in accordance with veterinary methods.

THERMOMETER SUGGESTIONS.

When buying a thermometer, select one which bears the name of the maker and with the scale etched on the glass stem, although one so made is usually more expensive than one with a metal scale. Further, in choosing a thermometer one should have in mind the use for which it is intended. There are thermometers for all uses—cooking, dairying, for outside, and so on.

With constant use one becomes acquainted with the instrument, so that dependence will be placed upon it; and with constant use uniform success in operations conditioned on temperature will be the reward.

RETAIL PUBLIC MARKETS.

By G. V. Branch,

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At intervals of a few years marked changes occur in the nature of the questions which engage the attention of municipal officials and civic organizations the country over. At one time political reform will be the paramount issue, then an antivice crusade. Another year may see efforts concentrated on the reduction of infant mortality, the upbuilding of the public park and playground system, the construction of boulevards, or the installation of improved street-lighting systems. The fact that these agitations are prompted by the most apparent economic or social needs of that particular period is quite self-evident.

Just now the question of cheaper and more efficient methods of distributing and marketing food products, particularly fresh farm produce, is probably receiving as much general attention and investigation as any other. Inasmuch as a successful solution will redound to the financial advantage of both the rural and urban populations, the reason for such widespread interest is a matter of easy determination, and especially so when the upward tendency of food prices is considered.

The problem of securing good products more cheaply, thus making an appreciable reduction in the average budget which the housewife must set aside for food, is proving a baffling one to every agency concerned in the quest. Cities, in an attempt to aid their populations, are awaking to the fact that they have been very lax in assuming proper obligations in relation to their food supply. Their first impulse is to see what other cities are doing, and in most cases their investigations end in a demand for a public market. They call for a place where the near-by producer can market his wares direct to the people. More often, however, and especially in the larger cities, the outcome is a farmers' wholesale market, or a retail market where the speculative dealers are in the majority. Unfortunately, city officials,

chambers of commerce, and civic-improvement leagues usually do not keep in close touch with the economic developments surrounding the marketing of farm products, so they find it hard to understand why there should be any trouble in establishing just the kind of market they want, and, along with it, securing the exact results for which they are seeking.

There are, however, some very difficult problems to work out in the successful establishment of even such an old-fashioned and apparently simple institution as a public market. Although a century ago the task was simple, the present complexity of the marketing system and the extraordinary demands in the way of service which are evidenced on all sides have greatly increased the difficulty of suiting an old-time project of this kind to more modern life. The attempt is met with disappointing results in a great many cases, due, however, to no fault of the principle itself. Public retail markets—old, dilapidated, mismanaged, and filthy—are numerous. Well-equipped, sanitary markets, of modern construction, efficiently conducted, are scarce. This is in reality no reflection on the possibilities of municipal retail markets, but only on the treatment that has been accorded them by most city governments. Being usually left to run themselves, they have done so, quite naturally selecting the path of least resistance, which, unfortunately, is down grade.

Given a fair start and continued good business management, a municipal retail public market should be a success in any average city that is large enough to support such a project. This statement is made with due regard to the fact that the success of an institution of this kind means more than simply fair patronage. The municipal retail market has certain functions to perform for the community, and unless it responds in a satisfactory way, after being given a fair trial, there is little excuse for its existence.

There are many who condemn a market unless, from the beginning, it affords lower prices. While this is a result that can reasonably be expected in well-directed institutions, nevertheless, plenty of time must be given for the balancing of the many factors that enter into price establishment. When a market is once firmly on its feet it would seem that a city could legitimately ask from it the following service:

It should give to patrons who will pay cash for their purchases and carry them home a dollar's worth of actual products for a dollar. In other words, when a buyer does not demand or use credit and delivery service he should not be charged for it.

Municipal market prices should also reflect to the consumer the saving which is made possible to the dealer through low rent for his stall and equipment, as well as any other reductions in overhead expense.

Patrons should be able to find at a market a larger and fresher assortment of food products than the average private establishment offers.

Due to the possibility of closer official inspection, the consumer has a right to look for increased protection in the matters of quality, weight, and measure.

When once a city has committed itself to a municipal market system, it is immediately confronted with innumerable problems. So little information is available on the subject that it usually must become a matter of experimentation. A serious mistake generally is made at this point. Instead of having a competent engineer or architect carefully study the problem and report, it is usually the custom to send a delegation of city officials on a junketing tour, some of whom may incidentally observe the municipal markets in the places visited. This would not be so detrimental if only the cities inspected were possessed of even semimodel marketing institutions. More often they are of a mediocre type, and, although possibly giving fair service, are far from fit to serve as patterns when the possibilities of a modern municipal retail market are considered.

It is to offer some suggestions to interested cities which may possibly help them in solving the difficulties confronting the successful establishment of a retail market, that the various questions which naturally come up at such a time are treated herewith in some detail.

LOCAL NEED AND DEMAND FOR A MARKET.

Inasmuch as the usefulness of a market depends on the support given it by the consumers, the tributary producers, and the local dealers, it is well worth while, before expending

time and money on the project, to determine the attitude of these people toward it. In meetings, or through the press, it is possible to ascertain the general sentiment. If all are apathetic and there is no definitely expressed desire for a market, then a city's energies might be turned more profitably to other lines of improvement.

Certain types of population lend themselves more readily to the municipal-market idea than others. Cities having a large foreign element and a well-developed middle class usually give most loyal support to such a project. Strange as it may seem, it is not always the very poor sections of a city that afford best patronage to a retail market. This is probably explained largely by the fact that the indigent class, as a rule, is quite dependent on the credit system. Lack of education in economic marketing and, to some extent, improvidence, are also contributing factors.

The size of a city and the efficiency of its marketing facilities have a direct bearing on the need for a public market. While a few small places could be named which have useful farmers' markets, still it is generally found that in the case of cities below 25,000 population or thereabouts such a large proportion of the homes are satisfactorily served by the grocer and the door-to-door peddling of the farmer and huckster that there is not sufficient patronage left to support a city market of any consequence. This statement is not to be construed as asserting that a profitable city marketing system could not be worked out for these smaller places. In such cities it should be quite possible, when conditions warrant, at least to furnish the near-by producers a designated place to assemble once or twice a week and sell their products at retail.

However, those cities which reach the 25,000 to 50,000 class may well consider the advantages of a municipal market, particularly if the charges of their established retail agencies are unduly high or the service inefficient. Many cities complain that they suffer from a dearth of fresh produce, especially farm and orchard products, or that there appears to be a lack of competition among local dealers resulting in abnormally high prices. In such places a skillfully managed city market should be of great value.

The success of a public market often depends upon the size and character of its "farmers' line" (Pl. X, fig. 1). There seems to be an innate desire on the part of housewives to buy from the producer and in the open. Consequently it behooves a city to study the tributary rural population. If a good truck-growing section is already developed within driving distance, there should be no trouble about lack of supplies for the market, unless the growers produce their crops in such large quantities that they are forced to sell at wholesale. If there is little truck growing in the region, however, methods of encouraging the farmers to take up that work should be employed. Such an outlet for products as a good public market creates is, in itself, an incentive to growers to engage in truck-crop production and usually aids greatly in developing a near-by food supply.

TYPE OF MARKET.

The form of market which seems to be meeting with most favor at present is a combination of an inclosed building (for the sale of meat, fish, butter, and other products that should be protected) and an open space where the market wagons of farmers and hucksters can be accommodated (Pl. X, figs. 2 and 3). The street curb adjacent to the market hall is often used for the latter purpose, but a location inside of the property line is better as a rule. This open section (Pl. XI, fig. 1) should be equipped with sheds, if possible, for the protection of both buyer and seller, as is shown in Plate XI, figure 2.

As previously suggested, some cities that are not in position to equip and give proper support to an inclosed market house can often secure valuable service from open markets for farmers, or for farmers, hucksters, and pushcart men. This type of market can be located along the curb of a suitable street (Pl. XI, fig. 3) or on some convenient vacant plot. The main defects of such a market are that it affords little or no protection, sanitary or otherwise, to the products offered for sale, nor does it shelter the seller or his patrons from the elements. Good sheds perform this service to a certain extent but are often inadequate. A greater weakness, however, lies in the fact that this style

of market, if supplied largely by local growers, affords, as a rule, satisfactory service only during the months of production. If the municipal public-market idea is good, it should be applied all the year around and to as many food products as is logically possible.

The open market, however, has some advantages, particularly for the city that is just launching a municipal market policy. It can be started with little expense of time and money; it can be moved easily, providing the first location is found to be faulty; and it can be used as a means to determine the degree of support which will be given the project as a whole by both producer and consumer. The factors of demand, location, and cost are all important in a new venture of this kind, and the open market serves cheaply and well as a demonstration project. It should also promote interest and enthusiasm in a community for this form of more direct dealing.

An inclosed market building with no provision for producers' or hucksters' wagons usually finds favor only in the larger cities, where open space is not available.

LOCATION OF THE MARKET.

If there is one consideration more important than another, when the possibilities of success of a public market are being weighed, that one is location. Many a city has invested a goodly sum in a retail market only to find that they had foredoomed it to failure by having selected an out-of-the-way place. An example of such misfortune is evidenced in Plate X, figure 2.

The factors to be considered in choosing a site vary with the size of the city. The first question to be decided is whether the market should be located in a residential section or at a more central point. Both plans have their advocates. Theoretically, small public markets placed in the more densely populated residential sections of a city and within walking distance of a large number of housewives, would be best situated to give the service expected of such institutions. Under certain conditions this system may be advisable, but unfortunately it does not seem to be practicable in the majority of places. Most large cities

owning public markets have at least one, centrally located in the business section, which is larger and better equipped than the rest. To show the effect of such a market on the smaller markets in residential districts, it is only necessary to cite an incident which recently took place in one of the large middle-western cities.

After prolonged consideration, an official committee submitted a plan to the mayor covering an extension of the municipal market system. It contained a map of the city, with markets indicated at several points in the residential sections, where the population was fairly dense. The recommendation appeared very logical. The mayor submitted the plan for criticism to the superintendent of city markets, who in this case happened to be a student of the municipal-market subject. He agreed that on paper the plan looked good, but asserted that in practice it stood small chance of being successful. To explain his stand, he took the mayor and committee in the municipal automobile to the corner where the city's one residential market was then situated. It was originally a well-equipped, inviting little market, but now trade was dull and the place appeared unthrifty. On the same corner, awaiting a street car to take them to the large central market down town, stood six housewives with marketing baskets on their arms.

That roughly tells the story of why small markets in residential centers do not, as a rule, prove satisfactory. Farmers drive past them with their loads to sell on the larger markets where their trade is assured. Patrons go to the same places to get the advantage of a larger assortment of produce, and also because they usually have to go to the business district to shop anyway. It should be noted, too, that the value of a residential market is more subject to depreciation from shifting population (Pl. XII, fig. 1), than is that of a market more centrally located.

There are, without doubt, several examples of what might be termed residential markets that are now giving just the service desired of them. Possibly in the future such a plan will demonstrate its merits more conclusively and become an effective factor in city marketing systems.

There is reason to believe that in some places "neighborhood farmers' markets" may operate satisfactorily during

the growing season. With a curb or a vacant lot costing nothing as a site, and a few farmers who are willing to sell in this manner, there is everything to gain and very little risk in making the experiment. Denver is testing it out, and the development of the plan will be watched with interest (Pl. XII, fig. 2).

The experience of the majority of cities, then, and especially in the case of larger municipal markets, seems to favor central locations. In a city of small or medium size, where only one retail market is contemplated, this market doubtless should be placed as near the business center as it is possible to secure the necessary land. Rather than remove it far from the most accessible point, it would probably be advisable to use a section of a wide street, as has been the plan in Cincinnati (Pl. XII, fig. 3) and as in the case of the old Lexington Market in Baltimore. Inasmuch as the demands of traffic must be heeded, when a street is to be used for either an inclosed or a curb market it is sometimes better to choose one immediately adjacent to a main thoroughfare than to cause undue congestion, but the site chosen must be very accessible. If a retail market is to be combined in any way with a wholesale project, then entirely new factors, not discussed here, enter to influence the decision.

In the case of a large city that is developing a series of retail market buildings the best plan seems to be to locate them in the subsidiary business centers. Nearly every such city is divided into several more or less localized sections, as the north, south, east, or west side, each of which has its principal business district. There is much less danger of these centers changing so as to leave the market stranded than there is in the case of a residential section, and they usually have sufficient tributary trade to give proper support to such an institution.

In judging the accessibility of a market site two factors are of prime importance: the number of patrons who will walk to the market, and the street-car facilities. A market with a large tributary population within walking distance may save hundreds of dollars a day to these buyers in car fares. On the other hand, the patron from a distance should be able to ride very near the market entrance with as few transfers as possible.

In the case of retail markets which will be used extensively as an outlet by producers, a city should consider carefully the possibilities of trolley freight service in connection with various locations. Growers who live at some distance can often use this method for the transportation of their goods to great advantage, providing cars can be switched to the receiving platform of the market. Interurban lines are bound steadily to become more important factors in the handling of farm products, and it is advisable that full provision be made to develop the service.

In selecting a retail-market location, the demands of the future should always be kept in mind. Provision for expansion of the market plan as the city grows has been too often overlooked by municipalities—a fact which applies with equal truth to other civic projects.

CONSTRUCTION OF THE MARKET.

Other conditions being equal, a market house which has good breadth (Pl. XIII, fig. 1) is preferable to the long, narrow structure that it is necessary to build when erected in a street. The broader market lends itself to a more desirable arrangement of stalls and general equipment, while the handling of products is facilitated.

The object which every city should strive to attain in the construction of a municipal market is the highest degree of convenient and sanitary equipment at the minimum of cost. Ornate public buildings may be expedient as a rule, but, in the case of municipal markets, beauty and expensive construction should be strictly subservient to utility and economy. The mission of a market is to increase the efficiency and decrease the cost of food distribution; consequently, needless expenditure of money is out of harmony with the purpose to be fulfilled.

The use of wood in market construction is inexpedient in most cases. The constant application of water in cleaning makes woodwork very unsatisfactory. Tile, concrete, brick, steel, marble, and glass are the type of substances which answer best the demands of durability and sanitation.

It is not intended in this article to go into detail regarding the interior equipment of a municipal retail market. How-

ever, some suggestions as to matters often overlooked, and of desirable features now being used in the more modern establishments (Pl. XIII, fig. 2) will serve to show what points should receive special study and attention.

All counters should be raised far enough from the floor to permit of thorough scraping and washing underneath.

Floors should be of nonabsorbent material and so laid that they will drain thoroughly. Ample arrangements for flushing are necessary.

Inside walls should be of nonabsorbent material to the height of about 6 feet.

Meat, poultry, fish, oyster, and butter counters, at least, should be constructed of some of the more impervious materials, such as glass, marble, tile, soapstone, or slate.

It is very desirable that such counters be provided with refrigerating equipment that will keep the products cool and free from flies. These results can be obtained even in semiopen counters by installing a refrigerating coil in back, on a level with the products displayed, while plate glass is placed vertically in front and horizontally over a section of the top. Such an arrangement not only exhibits meats and similar foodstuffs to advantage, but it also performs the exceedingly important service of preventing patrons from handling the fresh cuts of meat and testing the tenderness thereof with a punch of the finger or thumb, an insanitary practice which has become very common in markets.

Stalls for the sale of fish and other sea food should be segregated from the others in a separate room, in order that the characteristic odors attending them will not permeate the market hall proper, and so that the handling of these products can be accomplished without bringing them in contact with other parts of the building.

The typhoid fly, the rat, and the mouse are the chief pests which infest a market. Every possible means should be employed to minimize their numbers.

Good light and ventilation are not only important from a sanitary point of view, but add greatly to the attractiveness of a market.

Somewhere on the market property, preferably outside of the inclosed market hall, a suitable comfort station should be constructed.

FIG. 1.—VIEW OF "FARMERS' LINE" ALONG THE CURB OF EASTERN MARKET, ONE OF WASHINGTON'S SIX MUNICIPAL RETAIL MARKETS.

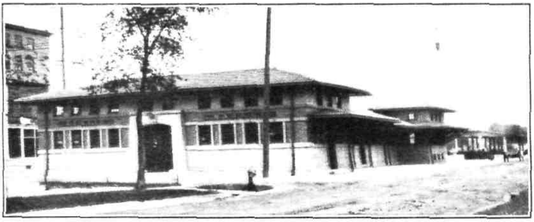

FIG. 2.—VIEW SHOWING THE INCLOSED BUILDING AND OPEN SPACE CONSTITUTING A $55,000 RETAIL MARKET OF A MIDDLE WESTERN CITY.

[This market is a comparative failure, due to its poor location.]

FIG. 3.—PORTION OF FANEUIL HALL MARKET IN BOSTON, SHOWING BUILDING FOR SALE OF MEATS, BUTTER, FISH, ETC., AND THE OPEN SPACE FOR PRODUCERS' WAGONS.

[One of the oldest market places in the country, which still remains a thriving trade center.]

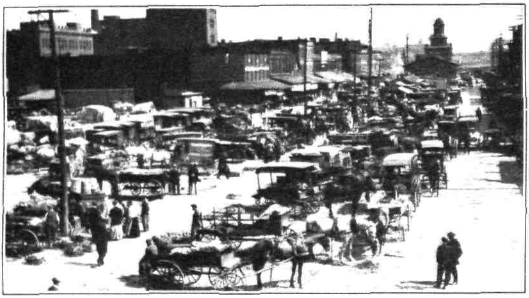

FIG. 1.—OPEN PART OF THE ELK STREET MARKET, BUFFALO, SHOWING INCLOSED BUILDING IN THE DISTANCE.

[Farmers and hucksters sell at both wholesale and retail along the curbs.]

FIG. 2.—PARTIAL VIEW OF THE 10-ACRE OPEN MARKET AT ROCHESTER, N. Y.

[Note steel sheds and brick pavement. While originally a wholesale market, it now caters to the consumer as well.]

FIG. 3.—A SECTION OF THE FARMERS' RETAIL CURB MARKET AT DUBUQUE, IOWA.

[On Saturdays there have been as many as sixteen blocks like this. Photograph by J. H. Spencer, Dubuque, Iowa.]

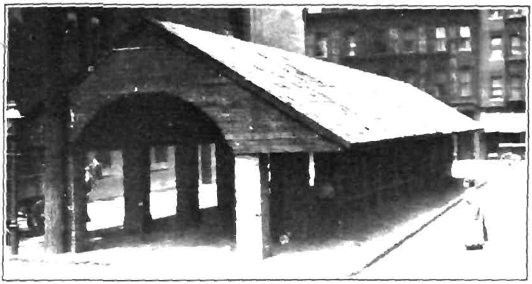

FIG. 1.—AN OLD-TIME MUNICIPAL RETAIL MARKET IN PITTSBURGH LONG AGO DISCARDED BECAUSE THE SHIFTING OF POPULATION REDUCED THE TRADE.

FIG. 2.—ONE OF DENVER'S "NEIGHBORHOOD MARKETS," WHERE FARMERS SELL TO THE HOUSEWIVES IN THE RESIDENTIAL DISTRICTS.

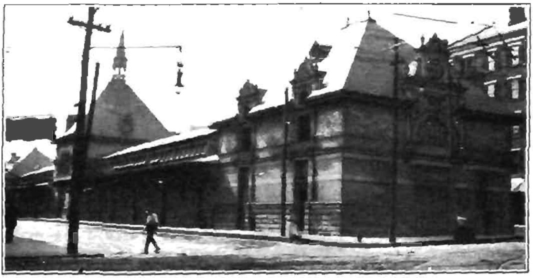

FIG. 3.—PEARL STREET MARKET IN CINCINNATI, AN EXAMPLE OF THE LONG, NARROW TYPE OF MARKET HALL LOCATED IN THE MIDDLE OF THE STREET.

FIG. 1.—CLEVELAND'S NEW WEST SIDE MARKET, A BEAUTIFUL BUT NEEDLESSLY EXPENSIVE INSTITUTION.

[A type of the broader construction in market buildings.]

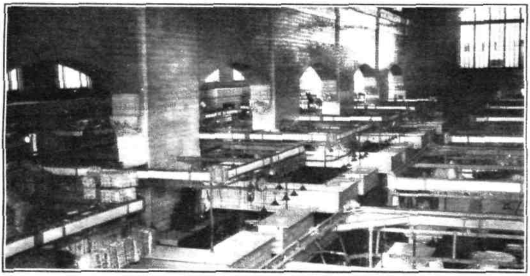

FIG. 2.—INTERIOR VIEW OF SAME.

[Note sanitary equipment and 13-inch double-dial scales hung in plain view of customers.]

FIG. 3.—A VIEW OF DENVER'S BIG WHOLESALE AND RETAIL FARMERS' MARKET, SHOWING FOUR OF THE NINE STEEL SHEDS.

There is no doubt that modern sanitary equipment combined with refrigeration service is an expensive item in the construction of a market. However, the day of filthy, unattractive, and poorly equipped markets is passing. If the municipal retail market is to compete successfully with progressive private establishments, then it must assume a high standard. In fact, it should be a model of efficiency and sanitation, so that other retail agencies will be influenced toward improvement in these directions.

The increased possibilities of mechanical refrigeration in connection with a retail market are being demonstrated continually. It not only furnishes the most convenient and sanitary method of cooling small storage compartments and counters in the market hall proper, but cold-storage rooms in the basement or on the second floor can be made of great value. Some of these rooms should be subdivided into a number of individual slat lockers, to be rented to dealers who wish to keep their surplus stock in good condition from day to day. If desired, other rooms can be used for commercial storage, a feature which should be very attractive, especially in those places that lack privately owned facilities of this nature.

In every large city there is much complaint from residents who have no storage space available, regarding the impossibility of renting cold-storage facilities in units small enough for family use. Commercial storage plants have not found it profitable, as yet, to cater to such small consignments, the bother more than offsetting any charges which this class of business will stand. However, there is a distinct need for just this kind of service. Many private homes, boarding houses, small restaurants, and other similar institutions in the community can not deal in large enough quantities to make practical the use of present commercial storage facilities. What they desire is a place, not too far distant, where they may store a case of eggs or barrel of fruit with the privilege of withdrawing small quantities once or twice a week. There are many problems of detail to be worked out before such service can be made efficient and satisfactory, but no better medium of experiment and demonstration is needed than the cold-storage equipment of a municipal market.

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Such an institution should be dedicated to the service of the community, and consequently the matter of trouble or lack of profit from such business ought not to prohibit a sincere effort to give the people the storage facilities in question.

The construction of the open part of a retail market devoted to the accommodation of producers' wagons, hucksters' wagons, and pushcarts, depends to a great extent on the space available. Many cities, especially the larger ones, have no place other than the middle of the street or the street curb to use for this purpose. Under these conditions it is difficult to arrange for any satisfactory protective agencies overhead except the simple canvas coverings of varied construction furnished by the dealers themselves.

In cases where there is a suitable site for an open market inside of the property line, certain very desirable improvements can be made profitably. For sanitary reasons, as well as for convenience, the space should be paved with brick or some other suitable material (Pl. XI, fig. 2), and proper facilities installed for flushing and drainage. Steel sheds (Pl. XI, fig. 2) to protect both the seller's load of products and the buyer should be erected. In retail markets these sheds are usually provided with a raised concrete walk running lengthwise through the center, on which the displaying, buying, and selling of products are carried on. If the open retail market is to be used as a wholesale market as well (Pl. XIII, fig. 3) then the size of the sheds and stall arrangement often needs to be varied to suit local conditions and customs prevalent among the wholesale trade.

FINANCING THE MARKET.

When funds of any considerable amount are needed, the ordinary bond issue is used most commonly to provide for the establishment of city markets. When curb or other unimproved open markets are used, the small expense incurred can be met from the funds of some established department of the city government.

Many cities measure the success of their markets by the revenue which they derive therefrom. In so far as revenues are an indication of the amount of business transacted, the practice is not especially subject to criticism, but when municipal markets are prized mainly for the high returns

which they make from excessive stall rent, then it is very evident that the primary purpose of the market is being defeated by the city itself. In building a retail public market it should be the aim to furnish first-class equipment for the handling of food products at just as low a rental as is possible, considering the running expenses, investment, interest, and depreciation. A reduction of overhead expense is essential if retail quotations are to be lowered materially. A public market should perform this function of lessening the high operating charges of the retailer, and then measures should be taken which will cause this saving to be evidenced in cheaper prices to the consumer.

Considering the financial management of a successful market, there are, very evidently, three methods of operation—at a loss, at cost, or at a profit. Any deficiency resulting from the first method must needs be made up by funds derived from some form of tax. It could be justified from a practical point of view only in case the low stall rents charged were responsible for reduced retail prices and marked communal benefits which might result from the effect of the market as a retail-price governor. However, on account of the fact that under average administration the savings effected by such low rentals do not accrue always to the benefit of the consumer, and inasmuch as the policy of conducting such an institution at a loss is apt to engender a great amount of opposition, it is no doubt wise to use some other system.

As the matter of large net profits to be gained from a market is incompatible with the whole municipal-market idea, it remains for one to dwell on the advantages of the second method named, that of conducting the market at cost, with the possible addition of a reserve fund to be used in retiring a certain percentage of the bonds at stated intervals. This idea seems to be the most satisfactory when viewed from all angles. It contemplates making the market self-sustaining, a good feature in any business proposition. It makes for very nominal stall fees, thus lowering the overhead costs to the renter. It placates to a great extent that class of citizens who oppose every civic improvement that calls for an expenditure of money.

Whatever the system employed, it is very essential that in leasing market stalls the city retain full control, making the duration of the lease short, and tenure subject to full compliance with all the rules and regulations of the market. In order to vary rentals when necessary, eradicate dishonesty in all forms, enforce sanitary measures, and apply desirable ideas for the general improvement of the municipal market service, it is necessary that the occupancy of a market stall be subject to speedy termination on the part of the management when conditions warrant.

One of the large eastern cities, owner of 11 municipal markets, recently faced a crisis in the conduct of this phase of city activity, due to lack of foresight in the financial policy employed when the various markets were built. In order to recover quickly the amount expended for a market, it was the habit to sell the stalls at public auction. Under this system, by the payment of an annual license and rental, the stall practically became the property of the purchaser. It could be rented, traded, or sold the same as any other possession. As a result, when changed conditions necessitated higher stall charges in order to provide a surplus for much needed market repairs, this move on the part of the city was met by a suit, instituted by the dealers, denying the city's right to increase the rent specified in the original bill of sale. It required about two years' strenuous work on the part of the municipality's legal department to secure from the courts a sustaining verdict, and in the meantime the markets suffered greatly through depreciation.

Under such a system the value of public property accrues to the benefit of an individual, as is shown by the fact that in this city some of the market stalls are appraised as high as $3,000, although their purchase price was not more than half that much. Many are subrented for a sum that will bring 10 per cent on their present value and up to 20 per cent on the original investment. Instances are related of Italian lessees who are now living in their native country mainly on the revenue which they derive from subrenting the stalls which they hold in the markets of the city mentioned.

The privileges of subletting space in a municipal market and transferring a lease to another party are freely offered

by many cities to stall renters. A little thought should make it evident that either concession is detrimental to the best interests of the market enterprise. By keeping in mind the fact that one of the chief functions of a municipal market is to lower food costs by reducing the overhead expenses of the dealer, it can be seen plainly that the subletting or transfer of a stand, for a substantial money consideration, adds an unnecessary financial burden, the amount of which the new occupant must needs try to recover from the buying public.

It is also manifestly unfair to other citizens not so favored for a municipality to furnish low-priced facilities to certain individuals, namely, the stall renters, by the manipulation of which these individuals can realize substantial unearned increment. However, this is exactly what happens when a city leases a desirable municipal market stall for $72 a year and the renter transfers his lease to a third party for a $1,200 cash consideration, or sublets the stall at the rate of $300 per annum. While this is a hypothetical case, its parallel in market transactions can often be found.

Inasmuch as a public market is a community institution, paid for and sustained out of public funds, all values which it creates should be returned to the municipality, except a fair remuneration which necessarily must be paid the stall renters in the shape of profits for the service which they perform. In order that this condition may prevail, one of the requisites is that there be no subletting or transfer of stalls unless, perchance, unusual conditions seem to justify such action. The original renter of a stand should be the user, and when his occupancy is terminated, the space should be given to the first applicant on the waiting list or drawn for by lot.

MARKET REGULATIONS AND MANAGEMENT.

Probably the average municipal market suffers as much from the lack of proper business management as from any other one thing. The larger proportion of markets are left to manage themselves, and then the cities possessing them condemn the lack of satisfactory service. Is it a cause of wonder that in such markets dealers are in control, prices

are fixed, patronage dwindles, and the expected benefits do not materialize? Considering average conditions, how can a city treasurer's office, a board of public works, or a caretaker at $40 per month be expected to conduct such an institution successfully when acquainted with neither the problems of a retail public market nor the service which it should render the people? A competent managing official, therefore, can be reckoned among the chief needs of any city that inaugurates a municipal-market system, and such an official should have not only understanding but vision.

After a market is opened to the public, there are two annoying problems which are of almost constant recurrence. To secure healthy competition among sellers, thus doing away with price fixing, and to eliminate dishonesty in all its forms, are tasks beset with difficulties. Most cities give up the attempt, but one of the middle-western municipalities has solved the proposition to its satisfaction. The city retains absolute control of the market. Full rein is given the superintendent of markets, and all responsibility is placed upon him. When he rents either the outside or inside stalls it is expressly stipulated that the prospective occupant can sell there only as long as he deals fairly with the public and so conducts his business that it does not become detrimental to the best interests of the market. It required the elimination of only three or four undesirables to impress upon all the other dealers the fact that competition and fair dealing must prevail on that market. As a result, not a single complaint of dishonesty has been made by patrons for nearly two years. Better still, no suggestion of fixed prices is apparent, all dealers working on the principle of a large volume of business at a small margin of profit, rather than the opposite method so often apparent in the present retail system.

The efficiency of many municipal markets is greatly reduced by their subserviency to political influence. Often market stalls are made awards for party service, as are also the offices and positions which a market affords. It is hardly necessary to comment on the destructive effect which such a condition exerts both on the market itself and on the benefits which it should render the community.

There are many who consider the matter of a credit and delivery service in connection with a public market as a

debatable question. This would seem to depend on what are to be considered the logical functions of such a market. If a reduction of food prices through lessened overhead expense to the dealer is one, then credit and delivery at his expense should be discountenanced. To afford any considerable economy, all goods on a municipal retail market should be sold for cash, and carried home unless a common delivery system is available, the charges of which are paid by the purchaser. The equipment for such a system could be furnished by private enterprise, if that prove satisfactory, or, if expedient, by the city itself. Such a method of delivery in connection with a market is very desirable and can be made practical.

Many markets have found it advisable to rule out telephones on the ground that a telephone order calls for delivery, and, in turn, establishes a credit charge, if, for any reason, collection can not be made when the goods are delivered. This rule finds further justification in the fact that ordering by telephone prevents the housewife from personally inspecting, before buying, the quality and assortment of products which the market offers.

PUBLICITY OF MARKET NEWS.

The possibilities for good of a rationally conducted market news service in connection with a municipal market system are just being realized. The average housewife suffers an almost daily loss through her ignorance of what products the market most liberally affords and current quotations on foodstuffs in general. Intelligent publicity of reliable information of this nature should prove to many cities a service rivaling in value any other feature of public-market activity.

The city of Berlin has worked out this idea very satisfactorily in connection with its municipal wholesale markets. Several municipal sales agents who sell in the central market, either at auction or private sale, report their transactions to the city authorities, and they, in conjunction with the state market police, publish the prices obtained in the wholesale market each day in the Official Market Bulletin. This practice has proved a meritorious one and is indorsed alike by dealers, trade papers, consumers, and others interested in the distribution of food products.

IN CONCLUSION.

Let it be said that this discussion does not aim to cover fully the field of municipal retail markets. Only some of the more salient points which face a city interested in this problem are treated. Numberless questions of a more incidental nature demand careful consideration when the actual construction and management of a market are attempted. Nor is it thought that all of the conclusions reached herein can be applied successfully to every city. Unusual local conditions or prejudices might render advisable an entirely different treatment than is here set forth.

While the municipal retail market surely has its place in the present system of food distribution, its introduction should be accompanied with even more mature judgment than would attend the establishment of business institutions by private agencies, for, in committing itself to the retail-market policy, a city is departing somewhat from the conservative path. The public market is not a panacea for the weaknesses of the retail system, nor is it advocated that its use should displace the old established agencies of retail marketing. Rather, its service should supplement, cooperate with, and to some extent regulate that which they give.

COOPERATIVE MARKETING, AND FINANCING OF MARKETING ASSOCIATIONS.

By C. E. Bassett and Clarence W. Moomaw, *Specialists in Cooperative Organization*, and W. H. Kerr, *Investigator in Market Business Practice, Office of Markets and Rural Organization.*

FARMING should be not only a scientific occupation but a successful business. Every branch of the industry should be founded on well-established, economic business principles.

Numerous educational agencies have been at work to raise farming to the rank of a science, to teach the farmer how to make the proper use of the forces of nature, and to work in harmony with natural laws. But conditions are now such that both producers and consumers feel there is something radically wrong with the business of marketing farm products.

For many decades in this country cheap virgin soils made cheap production possible, so that farmers have felt only the need of concerning themselves with matters of large production. But higher land values, higher paid labor, the call for expensive fertilizers, and the increased expense of fighting diseases and insect and fungus pests, together with decreased yields in some cases, have emphasized the need of a radical change in business methods.

One class contends that the land is not being properly farmed and that what is needed is to make the land produce more to the acre. While it is desirable to increase production, the mere doubling of production will not necessarily greatly improve the conditions of the farmer or relieve the burden of high prices to the consumer. It is a matter of record that the largest apple crop, the largest corn crop, and the largest cotton crop in the history of the Nation have yielded the producers of those crops a less amount of profit than has been obtained in certain years of less production; and it is also known that in these years of enormous crops the prices paid by consumers in most sections have not

reflected, in a proper degree, the low prices paid to the farmers. With this knowledge of the facts, what farmer will be encouraged to grow "two blades of grass" when he fails to realize a fair return for the "one blade" which he now grows? It can not be made clear to him that better *returns wait on increased production* until he feels that present production is fairly remunerative.

To the careful student of the problem it seems evident that it is the lack of an efficient *system of distribution and* marketing that causes much of the trouble, and it is because of the lack of a marketing plan that the present-day average farming can not claim to be a business, but simply an occupation.

This country has innumerable examples of success in manufacturing, but where can be found one in which all the thought is given to production and no attention is given to the distribution and selling of the products?

The farmer is himself a manufacturer, but when the manner of selling his products is observed the conclusion is formed that his marketing methods are not worthy of the name, as they consist chiefly of "dumping" rather than of marketing.

Many a case of so-called "overproduction" is only a failure to distribute properly the products to the points where they are desired. While one market suffers from congestion, caused by an oversupply, another may be suffering for want of a sufficient amount, and at the same time tons of food products may be wasting in fields and orchards for want of a profitable market. The remedy lies in a more uniform distribution.

Many reformers attribute marketing difficulties to the presence of so many speculators and middlemen; but it must be remembered that these intermediary agents have come into existence *to perform services that the farmer fails to* perform for himself. If the farmer will not or can not arrange to finance his business, he must expect to pay others to do it for him. If he will not or can not store his crops and hold them until the markets are ready to use them, he calls into existence a class of speculators who demand and receive a liberal price for taking the chance and performing

these services. If he is unable personally to distribute his crops and deal direct with the consumer, he must employ agents or commission men to do this work for him. All of these agents must be paid, and most of them are in a position to collect their charge, whether or not the consignor realizes anything at all.

Successful farming operations are largely concerned with the elimination of waste—the waste caused by diseases and pests, the waste caused by the neglect of natural resources, and the waste of misapplied labor. If it appears that these present-day methods of distributing and marketing farm crops are wasteful, then it is the business of the farmer to evolve a plan whereby he can do some of that work which he now pays others to perform.

But the individual grower frequently discovers that he is unable to do certain things which are economically essential. The average grower is not competent to grade and inspect his own products, and, even if he were, he does not produce enough to create a reputation beyond the limits of his own private trade. Not being able to ship full carloads, his products are transported to market under more expensive freight or express rates. The extent of his business does not warrant any great expense in securing reliable information as to market conditions and prices. This lack of information puts him at a disadvantage when dealing with well-informed buyers. It might seem wise to attempt to increase consumption of a certain product by a campaign of educational advertising, but the individual producer can not afford to finance such an undertaking, as other producers would profit equally with himself in any resultant benefits. If all are benefited, all should contribute. Working alone, the average farmer is practically helpless to develop an efficient marketing system.

COOPERATION AS A REMEDY.

A new faith has developed on the part of the farmers themselves that the cooperative plan of doing farm business is the most satisfactory method. Like the European farmer, the American farmer is being driven to cooperation by necessity. In the United States the necessity arises chiefly from

the costly, clumsy, and unbusinesslike methods of distributing food products, resulting in an abnormal discrepancy between the price paid to the producer and the cost to the consumer.

American farmers are beginning to realize that by selling cooperatively they not only will be able to offer a standardized product and reduce the cost of marketing, but they will be able to furnish this better article to the consumer at the same or even a lower price, thus stimulating consumption. In fact, any system of marketing that does not hope to give better service or better prices to the consumer, and, at the same time, secure for the producer a greater net return, is founded on improper principles.

The producers of perishable products that are grown at a great distance from the consuming markets have been the first class to be driven to a system of cooperative marketing. This accounts for the fact that the best organized cooperative marketing associations in America are found among the California citrus-fruit and nut growers and the deciduous-fruit growers of the Pacific Northwest. The perishable nature of the products and the heavy transportation expense have compelled the growers to organize and stay organized, so that they might grow the best, grade and pack honestly, distribute evenly, and market economically.

The work of the marketing associations includes the *establishing of grades and standards;* the adoption of brands and trade-marks; the securing of capital and credit; proper advertising to encourage consumption of a meritorious but little-known product; discovery of new and extension of old markets; securing information as to crop and market conditions; the equitable division of profits; adapting production to meet market requirements; the use of by-products; securing cold and common storage facilities; the cooperative buying and manufacturing of supplies; cooperative use of expensive farm machinery; securing of lower freight rates, more equitable refrigeration charges, and more efficient transportation service; the securing of more and better labor; and the general cultivation of a spirit of cooperation in all community affairs.

A cooperative enterprise is not automatic. Joining such an organization is but a start. The benefits come from mak-

ing use of the system. Several farmers might unite in purchasing a thrashing machine, but no benefits would follow unless the members make use of the machine. If they continue to patronize other thrashing outfits with part of their grain, the success from their purchase will be incomplete and the venture may even result in a loss. No cooperative marketing association should be attempted unless the prospective members feel that it will do the work better or at a less cost than any existing plan. The object must be to eliminate or reduce waste.

Farmers must be willing to furnish their products, invest their share of the necessary capital, and at all times give their enthusiasm and most loyal support to the cooperative enterprise undertaken. Frequently a member offers to "let" the association handle a part of his products, forgetting that the favor is to himself rather than to the organization and that the part of his crops which he holds back furnishes the most difficult competition for the cooperative effort to face. The person who lacks sufficient faith in the cooperative plan to "go in all over" will prove an element of weakness rather than of strength.

Strange as it may seem, there are many who prefer to ship their products to a distant market, of which they know practically nothing, to be handled by some firm, of whom they know less, rather than to have their property marketed by a competent manager of their own selection, acting under surety bonds, and who is directly answerable to themselves. A person who prefers to patronize a market lottery, when he knows from experience that his prospect of drawing a prize is very improbable, is not ready for a united effort with his neighbors.

Farming communities cooperate to secure better churches, better local government, and better schools. If they are willing to leave their religion, their politics, and the education of their children to cooperation, why should they hesitate to leave the marketing of their farm crops to a cooperative system that has passed the experimental stage? It seems to be largely due to their training along individual lines—to their spirit of "going it alone."

BASIC PRINCIPLES.

Cooperation is the act of working with others for a common benefit. This means that all must work and all should share in the benefits in proportion to the support given by each to the enterprise. In a cooperative purchasing and marketing association a certain amount of capital may be necessary and those who furnish it must be paid for its use—usually the legal rate of interest. But the profits of the business come from the patronage, either on goods bought or sold or services rendered. Profits are therefore divided on this basis rather than on the amount of capital invested. In this respect cooperative associations differ from ordinary business investments.

As in the Nation each citizen is entitled to one vote, so in a cooperative association members usually stand on a voting equality. To avoid the danger of cumulative voting, proxies should not be allowed. Members should be bona fide producers. The development of the enterprise should be from within outward, as a natural growth, and every approach of the professional promoter should be scanned with caution. Small local organizations are safest at the outset, but these should learn to federate for greater efficiency.

A section which makes a specialty of producing a few standard varieties of some one crop offers the most promising field for cooperation, as it gives the association the advantage of a large amount of one commodity. One of the hardest problems in marketing is to build up a trade in small quantities of practically everything that is raised on the general farm and maturing in small quantities at different times. Cooperation, therefore, lends itself more successfully to the marketing of highly specialized and localized crops.

NECESSITY.

Many students of rural economics assert that cooperation as applied to the distribution and marketing of farm products is not very successful unless it is founded upon dire necessity. When the records of the organizations of the country are analyzed it becomes almost necessary to accept that statement. So long as farmers do fairly well in their own way they are not inclined to cooperate. This attitude is based

largely on the independence they have enjoyed for so many years. They are slow to delegate to another the control of anything that concerns them personally. Furthermore, as a class they are exceedingly suspicious of efforts made by others to improve their conditions. This is not true of all communities, because in parts of the country the agriculturists are specialists in certain lines that require great intelligence and judgment. Generally speaking, however, farmers will not successfully cooperate until their condition becomes unbearable.

FORM OF ORGANIZATION.

The form of organization should embody the basic principles and the association should be incorporated under the laws of the State in which it will operate. This is to protect the members and the association by limiting their respective powers, duties, and responsibilities. The plan of association must be suited to the local conditions. Simply because a certain plan has been successfully applied in one section does not warrant the conclusion that it can be copied for some other section, for the conditions may be very different. It is far more practicable to mold the organization to fit the circumstances than to try to fit the circumstances to the organization.

For instance, whether the association shall take the form of a capital stock or nonstock organization will depend greatly on the attitude of local bankers and the ability to borrow funds necessary for the proper conduct of the business. Furthermore, the products to be handled, the location of the markets, the functions to be performed, and the character of the farmers to be organized are important determining factors that must have serious consideration in the plan adopted. The "tight and fast bind all" arrangement which secures good results in a community of freeholders might prove to be ineffective when dealing with a shifting tenant element. In organizing, common sense must be mixed abundantly with the usual enthusiasm attendant upon such an undertaking if a practical plan is to be secured.

The corporation laws of the various States have had much to do with the form of organizations effected in the past. There is great diversity among these laws. Several

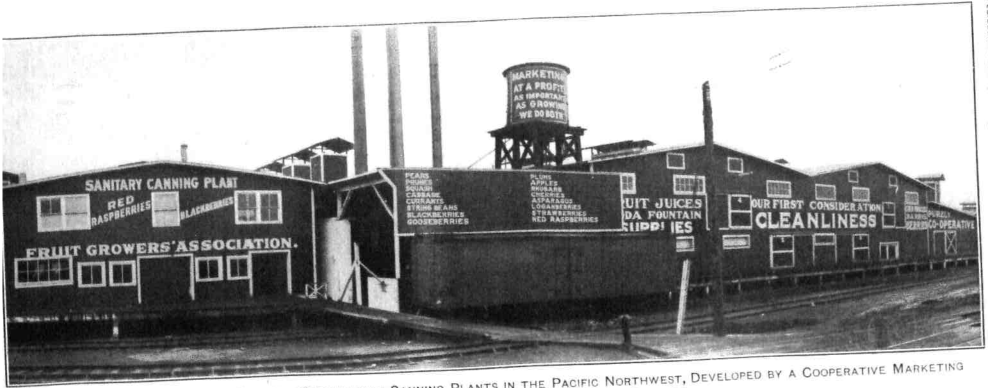
progressive States have adopted special laws fixing the simple standards of cooperation and fostering the development of cooperative organizations. In the majority of States the regular corporation laws must be applied, and these corporation laws are generally poorly adapted to this purpose.

CAPABLE MANAGEMENT.

There are a number of things that must be embodied in the form of organization and the method of handling the business, each of which is absolutely essential to success. First of all, capable management is required. The man in charge must be not only experienced, but he must be intelligent, diligent, and of good judgment, with tact and ability for keeping alive the enthusiasm, interest, and cooperation of the members. Excepting the disloyalty of members, inefficient management has been responsible more than any other factor for failures of cooperative organizations. This inefficiency is due to lack of sound judgment in selecting a manager, to poor salaries paid, and to the disrepute in which the position may be held because of conditions that may have come to surround it.

From a lack of knowledge as to the things required of an organization manager in the way of special qualifications for the position, selection of men to serve in this capacity for the most part has not been attended by sound judgment. Frequently failure has been the result. It is to be remembered that the successful distribution and marketing of perishable products in a large way requires ability of a fine order. A community adopts cooperative methods because it is beyond the capacity of the individual to perform successfully certain functions. It follows, therefore, that a man is required whose experience and capacity for management are superior to the *standard* of the farm community. Too frequently the producers select one of their own number for the position. Such a manager is primarily a producer and not a marketing agent. Furthermore, his activities necessarily are divided between private and public interest and it is to be admitted that such a division is not wholesome for either interest.

In order to secure a person expert in handling the affairs of an association, there assuredly must be a willingness to



PARTIAL VIEW OF ONE OF TWO STRICTLY COOPERATIVE CANNING PLANTS IN THE PACIFIC NORTHWEST, DEVELOPED BY A COOPERATIVE MARKETING ASSOCIATION TO CARE FOR ITS SURPLUS FRUIT AND PRODUCE.

[Incorporated in 1902 with a capital stock of $2,000, it has accumulated a net suplus of $100,000 and its total assets exceed $340,000. The association has a membership of more than 1,600 growers, and its business in 1914 was in excess of $1,300,000. The success is due to most efficient management, the continued patronage of the members, and the extent of the business. This association has developed an ideal combination, in that fresh products are marketed, surpluses taken care of in the canning plants, and supplies and merchandise handled for the members.]

pay him for his ability. A disinclination on the part of the farmers to remunerate properly the managers of cooperative enterprises has undoubtedly caused many failures.

The position of manager in a cooperative marketing organization is difficult to fill properly, because it is undesirable. It requires the soul of patience and self-sacrifice to stand by the job in the face of the nagging to which the man who occupies such a position is usually subjected by the membership. In some quarters it really seems the farmers think to secure better results by discouraging the manager. Frequently they make of him the proverbial goat—the recipient of kicks and knocks which apparently are administered for the purpose of forcing him to jerk along the cooperative machine more effectively. The fact that the manager can not possibly do his best under such treatment does not, as a rule, seem to occur to the members.

The manager should be employed by the board of directors and should have large powers. He should employ and discharge all labor; he should secure information as to crop and market conditions and furnish same to the members on request. He should encourage the production of the best varieties of products demanded by the trade. He should conduct packing schools, in order that growers may become trained in the best methods of grading, packing, and labeling their products. He should have charge of the grading, packing, and inspection of all association products, and should have control of the brands and labels and their use on the association packages, in accordance with the rules of the association. He should enter into contracts for the sale of the association goods. He should have entire charge of the marketing of all association goods, subject only to the action of the board of directors and the by-laws and rules of the association. He can not be held responsible if he is to be dictated to at will by each member or the officers are constantly to meddle with his work. This does not imply that the manager should be a dictator. He takes the suggestions of the officers and members and, from those of his own experience, he constructs a business plan. Whenever a manager loses the confidence of the members, it is better to replace him with a manager who possesses that confidence.

EXPENSES AND PAYMENTS.

The expenses of operating the association may be met by a percentage on returns for produce sold by the association or by a fixed price per package, the amount of such charge to be fixed by the directors. While many large organizations furnish supplies to members on credit, with ample security in most cases, all merchandise purchased by the association for the use of its members should be paid for in cash by each member in advance or on delivery, for any system of extending unprotected credit requires large capital and often results in considerable loss.

MEMBERSHIP AGREEMENT.

A farmers' organization must be conducted strictly upon business lines. There should be an agreement setting forth the terms of the relationship between the member and the association, for without such an agreement an organization lacks stability and rarely succeeds. This agreement is sometimes provided by signatures to a by-law as a contract between the members, or it is secured by a written contract between the members, or by a written contract between each member and the organization. The special advantages of such a provision will be mentioned later.

A member should have the right to give away or retain for his own use such of his farm products as he may wish, but he should not make sale of crops, promised to the association, to any outside parties, except any product not accepted by the association.

GRADES AND STANDARDS.

Farm products should be graded in accordance with specified standards. An effort should be made to secure greater uniformity in quality and to provide for the enforcement of standards that will furnish a common language between grower and purchaser and thus tend to place farm products upon a staple basis in the markets. This applies particularly to perishables.

It has been stated that farmers as a class are not competent to pack their own products. It is human nature that a man have great pride in that which he produees. He is

blind to defects in his own that he may condemn in the product of his neighbor. As a rule farmers have neither the facilities nor the time to prepare their products properly for market, and the conclusion is that cooperation is necessary to bring about uniformity in grade and pack. Such uniformity is exceedingly necessary for successful cooperation. It is very certain, as a general rule, that the successful farmers' associations are those that prepare the products for market or rigidly inspect the farmers' handling to see that it is done strictly in accordance with certain standards.

In cooperative marketing all goods produced for sale by the members should be delivered to the association as directed by the manager, in prime condition for grading, packing, and shipping. All grading and packing done on the grower's premises must be in accordance with the rules of the association and subject to such inspection as may be established by the directors. All produce should be inspected before shipment, and if any is not of good quality and in good condition for shipping, such produce should be sorted or otherwise prepared for shipment at the expense of the party to whom it belongs.

Products packed on the grower's premises should be inspected by an association inspector as they are being packed. The grower may be charged for his services as a head packer, but he must be held accountable alone to the association for his inspection work. The inspector's own private mark should be placed upon each package he inspects and he should be held jointly responsible with the grower for the pack, as it may be disclosed in the final market, ordinary deterioration excepted.

All brands, labels, and trade marks should be registered and become the property of the association and they should be attached only to such grades as shall be ordered by the board of directors.

BONDING.

All officers who may handle any of the funds or other property of the association should give a surety bond in excess of the value of the property which they are liable to handle at any one time. The cost of such bonds may be paid for by the association.

DIVIDENDS AND DAMAGES.

If the organization is a stock company and operated for profit, after the season's expenses are paid, and the proper sum set aside as a reserve for the depreciation of the association property, the balance of the season's profits may be divided as follows: (1) The stockholders should receive a reasonable rate of interest on the par value of their stock; (2) one-half of the balance may be set aside as a surplus fund, to increase the working capital, or to finance future improvements, until the surplus shall equal the capital stock; or, if the members so decide, it may be made greater; (3) the balance may be divided among the patrons, both members and nonmembers, in proportion to the value of their shipments and purchases made through the association during that season, the dividend to nonmembers being 50 per cent of the uniform rate to members. The nonmember should have the option of receiving his half dividend in cash or having it apply on the purchase of a share of stock, to make him a full member. If the organization is nonstock, the interest on the capital stock is eliminated, but the other features of profit distribution may be applied.

Some provision should be made that when any member has failed to live up to his agreements, by failing to ship exclusively through the association, or by any other breach of his contract, and provided further, that his failure has resulted in a loss or damage to the association, then the defaulting member should forfeit to the association such a sum as would reimburse the association for the loss or damages thus sustained, in lieu of liquidated damages. Some courts have held that to require a member to pay his association a fee for the privilege of selling contracted products to an outside dealer is in restraint of trade, therefore illegal. While it may not be legal for an association to penalize its members, it may be found that an association can legally provide, as in the above plan, to collect damages from a defaulting member, when losses or damages have actually resulted from the failure of the member to live up to his agreement. Some form of binding contract is essential to hold the members of an association together. Many an organization has failed because members were only bound

by a "gentleman's agreement." Such a membership is totally inadequate for a stable and long-enduring organization. The laws of the State should be studied so that this by-law for holding the members may be drawn legally.

POOLING INTERESTS.

Thoroughgoing agricultural cooperation naturally suggests the pooling of interests. Growers who ship like grades of the same products during a given time should receive like returns as a matter of justice, although the shipment of one may have sold at a high price because of the good fortune of arriving in a good market, whereas the shipment of another may have suffered great loss from conditions over which the grower and the organization had no control. Pooling of interests practically eliminates the element of chance in so far as the individual is concerned and tends to secure the satisfaction of all. However, without uniform grades it is not just to pool the shipments. To pool shipments without requiring that all grades and packs be alike would penalize the man who produces and packs the best, while, on the other hand, it would place a premium upon careless or dishonest methods.

Where the growers pack their own products each member should have a number or mark, which should be stamped permanently on every package shipped by him through the association. Any loss occasioned by improper packing or grading should be charged to the member whose mark is found on the package.

AUDITING.

The books and business of the association should be audited frequently by auditors selected from the membership. An annual audit should be made by a qualified accountant previous to the date of the annual meeting, at which meeting the report should be presented in full. Special audits should be made upon order of the board or upon a vote of the members at any legally called meeting. While small associations may not feel the need of such a strict system of investigating the accounts, it will pay to have this work done often and most thoroughly. If the association business is being done carelessly, frequent audits

will make it known and better methods may be adopted before any great loss occurs. The cost of an expert accountant is more than balanced by the confidence which it gives the members and because of its effectually stopping the criticism of faultfinders.

UTILIZATION OF BY-PRODUCTS.

It should be the purpose of a cooperative marketing organization to work out all possible economies in the industry of which it is a part. This suggests the utilization of by-products. Under the very best cultural methods there is always a percentage of the crop that will not grade sufficiently high to justify shipment. The cottonseed industries are founded upon a by-product. The preservation of dropped and culled fruits has come to be an industry within itself. The saving to the farmers from canneries, preserving houses, pickle factories, cider mills, and evaporators is very great, but, considering the fact that in a recent year, according to estimates, 100,000 carloads of agricultural products went to waste in the United States, the conclusion is inevitable that the utilization of the by-products of the farm has been accomplished to an exceedingly limited extent. (See Plate XIV.)

COOPERATION OF MEMBERS.

Of all things necessary to the success of a cooperative enterprise, the cooperation of members is the most essential. The most capable of officers, managers, and agents can not be expected to succeed in handling the affairs of organizations unless they receive the full strength of the members' patronage and their complete moral support. The disloyal member is the chief element of failure in cooperative circles.

It would appear that owing to the very fine principle of mutual help involved, those forming a cooperative organization would be consistently loyal in their mutual relationship. But, on the other hand, unless exceptional care be exercised by the leaders, an organization from the beginning will be burdened with drones, cheats, deadbeats, and traitors.

When a grower joins a cooperative organization and then refuses to patronize it, he is a drone. He can not excuse

himself even on the ground of bad management, for it is his duty to help secure proper conduct of the business.

If in selling through his organization a producer endeavors to pass off shoddy, poor-grade products, which injure the reputation of the body of which he is a member, he is a cheat.

The member who uses the special and private information of the association in making sales outside, without contributing to its support, is a deadbeat.

The man who joins a cooperative enterprise and then through subtle ways endeavors to obstruct its progress and defeat its purposes is a traitor.

Those experienced with cooperative organizations have known all these types. They are to be found in practically every community. They are the greatest enemies of agriculture and agricultural cooperation. If allowed to dominate with their dishonest practices, they will sap the energy, brains, and spirit of the officers, exhaust the moral and financial strength of the undertaking, and reduce the whole to a state of miserable failure and ruin.

There are certain safeguards that may be devised to protect the cooperative organization from these difficulties. The purpose of such an undertaking, of course, should be to secure harmony within the community and to work for its moral advancement as well as for its prosperity. Naturally, discrimination against any class of producers is not consistent with the spirit of cooperation, but if the presence of the above-mentioned types endangers prospects for success and it is impossible to arrange for their control within the organization, then the members or directors in meeting should make impossible the admission of such persons.

It is possible, however, under a fostering statute, so to construct the by-laws as practically to eliminate undesirables. Membership should be made dependent upon cooperation. If a grower does not propose to cooperate, he is not likely to join when he knows that by doing so he binds himself legally to deliver his output to the association in compliance with its rules and regulations, or to pay certain sums in lieu of liquidated damages and forfeit his interest in the enterprise for failure to do so.

OUTSIDE INTERFERENCE.

In case any member is offered a price in excess of the price then obtainable by the association, the member may be required to turn this bid over to the association for filling from this member's goods. Some such provision is necessary to prevent an outside disgruntled dealer from making a false bid, to test the member's loyalty, and arouse dissension, with the idea of disrupting the organization. Allowing the organization to handle this bid compels the bidder to pay up or back down; the grower gets the boosted price, if the bidder does not back down, and the organization handles the deal and so is strengthened rather than injured. One or two such experiences have usually discouraged this very common form of outside interference.

MORAL ERRORS.

There are many difficulties for which the cooperating members themselves are responsible. Such difficulties have been defined as "moral errors that endanger the permanence of cooperative societies." The purely business phases of cooperation have been thoroughly investigated and considered for more than two generations, but little attention has been paid to these moral errors which have caused such great disaster in cooperative circles. Such errors arise from the difficulty of tolerating and acting in harmony with those who may not be liked personally, of viewing the acts and rights of others in a liberal way and avoiding offensive imputations, and of aiding personally the advancement and growing prosperity of those who appear to be personally offensive and undeserving.

Those experienced in handling farmers' cooperative organizations know full well the tedious and trying situations that arise from the members. There have been times when members, laboring under false impressions or failing in a liberal broad-minded attitude and appreciation for efforts expended in their behalf, have tried to tear down and destroy that which was being built solely for their benefit. Farmers are urged to view their cooperative enterprises with better spirit and to stand by their associations as the best way to solve the large and difficult problems that are common to all.

FINANCING OF COOPERATIVE MARKETING ORGANIZATIONS.

In starting a cooperative marketing enterprise one of the most serious problems is that of financing its operations. Organization and promotion work is costly, and comparatively large sums of money are needed to meet the expenses of marketing the members' products and in many cases for making advances to the growers. Much of the work each year must be done before the shipping season begins, and until that time no revenue is available. Very few of these organizations have a paid-in capital stock and surplus, or other assets which are liquid, sufficient to meet the expenses of the business during the heavy marketing season. It is therefore necessary to secure funds from outside sources for these purposes. Practically none have the security which is generally required by bankers in making loans to business enterprises, and as a result until recently it has been practically impossible for cooperative marketing associations to secure loans without certain of the directors and members assuming a personal liability.

Perishable products marketed through an efficient organization are now considered good security by many bankers in making loans to cooperative marketing associations. Only a few years ago it was impossible to secure loans from a bank with a perishable product as collateral. In spite of this, many of the smaller organizations have little idea as to possibilities for developing credit by conducting their business along approved and efficient lines.

The amount of money required by marketing organizations will vary according to the size of the business and the methods of conducting it. Some which conduct merely a consignment business and do not make advances to the growers need but a small amount with which to meet general running expenses, and this in many cases is provided by the issuance of stock, collection of membership fees, or the accumulation of a surplus, a sufficient part of which is in such shape as to be quickly convertible into cash. Others have developed a large f. o. b. business which allows the drawing of drafts against shipments, these drafts being discounted and placed to the association's credit at the bank.

This gives funds for immediate use and decreases the amount of outside help needed in financing. Associations doing a marketing business in which returns from shipments may not be received for several weeks after the products have been delivered by the grower to the association will generally make liberal advances to meet harvesting and packing expenses. In event pools are made, advances are absolutely necessary, as the pool may not be entirely closed until months after the first receipts come in. However, after the first advances, returns from shipments will take care of the amounts advanced to growers. In some organizations the product is purchased outright and paid for at the time of delivery.

Under these plans of operation large sums of money, ranging from $1,000 to $500,000 per season, are required. These funds are secured usually from one or more of three sources, namely, banks, commission houses, and individual members of the associations.

BANK LOANS.

In practically all cases where bank loans are secured they are obtained from or through the local banks. Owing to the limit of a certain percentage of capital and surplus which banks can loan to one individual, it often happens that all the money required by the association can not be secured from the local bank. This is especially true of the organizations located in small towns. In such cases it has been found to be of great advantage to use the local bank as a medium through which loans are obtained, either from surrounding country banks or from banks in the financial centers.

A great many of the most successful associations have some member upon the board of directors who is connected with the local bank with which the association's banking business is done. Sometimes he is a member of the loan committee of the local bank and at the same time treasurer of the association. This has a great many advantages in that the bank has a representative upon the board who will naturally look after its interests as well as those of the association. Thus, many organizations have been fostered by local banks, where it would have been much more difficult

to secure the bank's aid if its officers had no voice in the affairs of the association. Another advantage to the association of such an arrangement is in having as its financial officer a man with banking experience, thus securing the services of a person much better qualified to administer the banking affairs of the business than the average director who has had no such experience.

COMMISSION-HOUSE LOANS.

The financing of cooperative marketing organizations by commission houses is most common among the farmers' elevators in the Northwest. By agreeing to consign a certain portion of its business, ranging from three-fourths to all of it, to the commission house, credit will be extended to the elevator. The general plan is that the elevator draws upon the commission firm from time to time as funds are needed, all shipments of grain to be made to the firm and credited upon receipt to this open account. It is estimated that over 51 per cent of the farmers' elevators in the Northwestern States are financed wholly or in part in this way.

In other grain sections practically none of the elevators are carried by the commission houses, they being financed by the local banks or having sufficient working capital of their own to carry on the business.

As a rule an elevator which is financed by a commission firm is handicapped in that it is impossible to take advantage of other markets which may from time to time offer better prices than can be obtained in the one in which the commission firm, through which it must sell, is located. Elevators not dependent in any way upon commission houses can ship first to one and then another, and in this way promote competition among the commission men in securing the best prices possible. The commission houses have served a useful purpose in the financing of the farmers' elevators, in that sometimes they gave financial aid when it was impossible to secure it elsewhere. Elevators are turning more and more each year to local sources for their funds, which no doubt is a better arrangement than being dependent upon commission firms. A relatively small number of the produce and fruit organizations are financed by commission men.

MEMBERS' LOANS TO ASSOCIATIONS.

Several associations meet the expenses incident to marketing by borrowing money from their own membership. Under this plan demand notes are issued bearing a rate of interest higher than that paid by the local savings bank. Sums ranging from $10 to as high as $4,000 have been secured from individual members in this way. This also encourages the habit of saving and fosters the feeling of individual interest in the organization among the members.

Of a somewhat similar nature is the method used by several fruit associations whereby certain percentages of the returns from the members' products are held back from distribution to meet general expenses until the next season's business starts, at which time the entire amount due for the previous season is distributed. This simply means a holding back from the growers sums sufficient to carry the business during the season of the year when no products are being marketed. This plan has worked with success in the marketing of citrus fruits, as the season for shipping is a long one, and there are few months when returns do not come in fast enough to take care of all advances and expenses.

SECURITY FOR BANK LOANS.

Cooperative marketing organizations which require a plant and equipment, such as farmers' elevators, creameries, cheese factories, canneries, cotton gins, packing houses, warehouses, etc., experience considerable difficulty in raising the funds required to fully equip themselves for operation. Various methods have been used, the most common of which has been the issuance of stock and the collection of membership fees. In addition to the funds thus required it is very often necessary to borrow from the local banks upon notes based upon the personal credit of members. After a few years these notes are taken up, and the organizations which have plants and equipment free from incumbrances have a basis for securing credit from bankers. After one or several years of successful operation the association is in a position to command credit on the basis of the past success. The first years are the hardest, as one of

the most difficult things in connection with the launching of a strictly cooperative organization is in getting enough money to conduct the business properly from the start. Plans for raising funds to build the necessary plants and purchase equipment must take local conditions into account.

In the case of properly organized, well supported, and efficiently managed organizations with a record for past success, bankers require merely the signature of the financial officers on the paper of the association given to the bank for short-time loans, which are used for marketing purposes. Organizations that make advances to the growers usually enter into contracts with the banker in which it is agreed to deliver, as payment upon loans made, certain percentages of the returns as they are received from the sale of the members' products.

The organizations which have high credit ratings are protected by contracts in which the grower agrees to deliver all of a given product to be marketed through the association. These contracts are considered by the banker in making loans, and it is certain that it would be most difficult to obtain money from a bank to meet the operating expenses where there was the probability of the members not living up to their contracts by marketing outside. There is no doubt that loyal and regular support of the members plays an important part in building up the credit of the association.

Most of the money required from outside sources is secured late in the growing season, when the crop is well matured. At this time a loan basis can be figured with reasonable certainty that the actual amount marketed will approximate the estimate of shipments.

A central selling association in the Pacific Northwest, with no capital stock and no surplus, has secured as high as $500,000 from the northwestern banks for one season's operations. This money was used in meeting the general marketing expenses of the central and for the operating expenses of the affiliated subcentrals and the growers' associations. A large part of the money secured for the latter was used for advances to individual growers. The only security given by the central for these loans was a note signed by the treasurer,

the understanding with the banks being that as soon as returns were received from the products shipped appropriate amounts therefrom would be deposited with the bank to reduce the loans. A large additional sum which was not needed was offered by these banks to this association

Some of the subcentrals affiliated with this central selling agency are able to finance themselves; that is, they have sufficient credit to obtain the necessary funds from local banks; but others require the assistance of the central for meeting their own expenses and those of the affiliated local associations. Where this assistance is given the association enters into a contract with the subcentral, in which it is agreed that certain percentages from returns are to be diverted and applied on the loans. In case advances are made to growers for production purposes, a form of crop mortgage is given to the association. Such amounts as are advanced for harvesting are based upon the amount of marketable products, and the only security required from the grower for these advances is a contract to deliver all his product to the association. The amounts advanced to the growers at the time of delivery of the products to the association are as large as consistent with safety in not overpaying.

It is possible for an association handling perishable products to make advances of this kind to the grower only when a reliable system of pooling is maintained.

WAREHOUSE RECEIPTS.

When associations are handling a product which can be warehoused, such as cotton, canned goods, grain, hay, nuts, and similar products, if it is desired to hold these products for a time awaiting better markets, or for future delivery, warehouse certificates are issued upon which loans up to 75 per cent of the market value of the warehoused product can usually be secured from banks. A case in point is that of a western walnut-growers' association. During 1912 over 300,000 pounds of walnuts were warehoused and carried over by the association for one year. Upon the warehouse receipts and a note of the association as collateral thirteen-fifteenths of the market value of the nuts was advanced by bankers. The note was required as additional security so that in case the price dropped below thirteen-fifteenths of the

market value the bankers would be protected. In some cases bankers have made short loans upon warehouse receipts for apples, dairy products, and other highly perishable commodities placed in cold storage.

Examples of extensive borrowing on warehouse certificates are common in the cotton States this year, owing to the condition of the market on account of the European war. Many banks are being taxed to their capacity in meeting the demands for loans on warehoused cotton.

The great difficulty encountered by the individual small producer, compared with that of large planters and cotton merchants in securing loans upon warehoused cotton, indicates the dire need of closer organization among cotton producers. The farmer with a few bales has a comparatively hard time in securing loans on his cotton. Pooled or large lots of cotton will command support in the way of loans from bankers in preference to hundreds of smaller loans.

INTEREST.

The rates of interest paid naturally vary from one section of the country to another. Several of the larger organizations borrowing large sums have been able to secure loans at a much lower rate than that generally charged in the community.

METHODS OF CREATING A SURPLUS FUND.

Many organizations have provided a means of building up a surplus fund with which to meet the expenses of the business and serve as a general working fund.

The most common method and the one which is extensively used by elevators, creameries, and cheese factories, is to set aside a percentage of each year's profits into a fund which shall be used as working capital. In this way, as the business develops and profits allow, in the course of a few years a working fund of considerable size can be obtained. If associations organized as stock companies would discontinue paying out the entire profits of each year's business and set aside at least a part of the earnings into a surplus fund, it would only be a matter of a few years in many cases until a sufficient amount could be secured to carry the business without outside help.

Another method of obtaining a surplus which is used among fruit and produce exchanges is that of an assessment per package on all deliveries by the members to the association. Under this plan amounts levied against each member are returnable in case of withdrawal from the association. Several associations have a 1-cent per package levy for this purpose. The amount of the levy per package will vary with the volume of business transacted and the sum desired for a surplus.

Another plan which has proved successful is to make a reduction of a certain sum for each package from the returns of all products shipped through the association. These deductions are considered as a loan to the association and are covered by notes due two, three, or four years after date of issue, with interest coupons attached. By this method the surplus can be held at the desired figure, except as it fluctuates with the increase and decrease in the volume of business. This provides a sufficient working capital furnished by and belonging to the growers in exact proportion in which they from year to year make use of the privileges of the association. In case they for any reason sever their connection the amounts contributed by them are returned as the notes mature. A surplus serves as a basis of credit and gives a cash account with which to pay the general running expenses before returns are received from shipments.

One thing must be considered in determining the advisability of the creation of a working fund or surplus. In some cases it is not necessary to have a surplus. This is true if the organization can secure outside help to carry on the business. A great many of the most successful marketing agencies have no surplus and no capital stock, but, on the other hand, there are cases in which a surplus is absolutely necessary, as loans from outside sources are not obtainable except by personal collateral of the members and directors.

That the bank depends upon the reliability and responsibility of the persons who conduct the business is clearly shown by a condition which is found in a comparatively large produce exchange. The banker that loans something over $65,000 each year to this organization will not enter into any arrangement for credit until after the annual

election of officers has been held. The banker in this case has confidence in the present personnel of the management and is reasonably sure from the record of the past that the business will be conducted in an efficient and conservative way. If a new management were secured, the personnel of which was unknown to the bankers, it would be difficult to secure funds until a demonstration had been made of the ability of the management to conduct the business properly.

There is no one factor of greater importance to an association in securing credit than that of capable management. Credit based upon character, ability, and a record of past successes is an element which a capable or ns agriculture and association. One of the biggest 's forces in this country made a statement as to credit for cooperative marketing agencies that "The management of an organization has more to do with the securing of money from outside sources than any other one feature. Where you have the right kind of management you generally have a strong organization."

The fundamental requirements of bankers in making loans to an association with a perishable product as collateral may be summarized as follows: An equitable plan of pooling like varieties and grades; good inspection; competent assembling and selling facilities, allowing efficient distribution which enables the selling in markets where the demand is greatest; contracts with growers which will be lived up to; the keeping of good accounting records; frequent audits; a management which is capable of holding the absolute confidence of members and others; also one in which the integrity, honesty, and business ability are unquestionable.

PARTICIPATION OF BUSINESS MEN.

A new phase in the development and operation of cooperative organizations has been held for last consideration. This is found in a new kind of relationship between business men and farmers. In many districts thoughtful men begin to realize their responsibility to the community in the way of aiding farmers with the solution of their problems. Especially in the organization of cooperative institutions for the distribution and marketing of farm products, the business men of the country have an opportunity to perform a dis-

tinct service for the good of agriculture. Certain communities in the far West present striking examples of what can be accomplished in this way.

The cooperation of the business men with the farmers in this respect seems to have its inception in the realization that agriculture is the primary industry of the Nation and that anything affecting its economic status seriously involves the entire community; consequently, the participation of the business men in solving the farmers' problems is but natural and proper. From lack of training and experience in the [illegible] and sale, farmers are not always able to cope well [illegible] problems that confront them in securing and maintaining [illegible] anization. However, the business men of the community may be well equipped to assist by supplying the lacking elements. Unfortunately the past has shown too often a lack of sympathetic relationship between farming and "big business." This is probably due to the isolation of producers, as well as to their belief that they have been exploited from time to time. They are generally suspicious of outside help, and because of this the business men of the community necessarily must be discreet in the matter of just how far they can go in this respect.

CONCLUSION.

Cooperation as an economic principle is receiving the serious consideration of practically all industrial classes. Its application to special lines of agricultural distribution and marketing is entirely feasible and offers a solution of problems and difficulties that are practically hopeless in so far as the individual is concerned. In the United States Department of Agriculture cooperative organization is considered to be a primary and fundamental project, for it is believed that cooperation in agriculture is a corrective measure that will place the industry upon a solid basis and do much to insure the future happiness and prosperity of the Nation.

STATE MANAGEMENT OF PUBLIC ROADS: ITS DEVELOPMENT AND TREND.

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INTRODUCTORY.

ADEQUATE transportation facilities are a vital factor in the prosperity and civilization of any country. They are essential to the development of its agriculture and manufactures, to the working of its forests and mines, and to the spread of education and enlightenment among its citizens. This necessity has been recognized by the foremost nations of every age and steps taken to meet it by improving the methods of transportation then current.

In the United States a movement for internal improvements was projected almost contemporaneously with the establishment of the Federal Government. This first took the form of highway improvement through the construction of toll roads by private corporations and the building of national highways by appropriations from the National Government. These appropriations for National highways were continued by Congress for a period of nearly half a century, and a total of about $14,000,000 was thus appropriated. About 1832, however, the steam locomotive was first used in this country, and an era of railroad development followed. It was believed by many that the railroads would obviate the necessity for highway improvement, and, consequently, efforts at improving the public highways of the country were largely abandoned. During this period of activity in railroad construction many thousands of miles of railroads were built. The success attending this movement is evidenced by the fact that to-day we have practically 244,000 miles of railroad, costing about $16,000,000,000, including equipment. This mileage carries annually more than 1,000,000,000 passengers and over 2,000,000,000 tons of freight. Railroad freight rates have fallen from $7\frac{1}{3}$ cents per ton-mile in about 1837 to $7\frac{1}{4}$

mills per ton-mile at the present time, or about one-tenth the original rate, and yet, even at this low rate, the annual gross receipts of the railroads amount to about $3,000,000,000. The cost of ocean transportation has been reduced even more phenomenally than railroad transportation. It costs under normal conditions only 4½ cents per bushel to carry wheat from New York to Liverpool, a distance of 3,000 miles, which would be at the rate of one-half mill per ton-mile. These rates have remained practically unchanged for a number of years, indicating that we can not hope for much further reduction in cost by these methods of transportation.

PRESENT COST OF PUBLIC ROAD TRANSPORTATION.

It should not be assumed, however, that all of our transportation problems have been solved, nor that there can be no further saving in our cost of hauling. The public roads throughout the country, which constitute the primary means of transportation for all agricultural products, for many millions of tons of forest, mine, and manufactured products, and which for a large percentage of farmers are the only avenues of transportation leading from the point of production to the point of consumption or rail shipment, have been improved to only a slight extent. By reason of this fact, the prevailing cost of hauling over these roads is about 23 cents per ton per mile. More than 350,000,000 tons are hauled over these roads each year, and the average haul is about 8 miles, from which it can readily be seen that our annual bill for hauling over the public roads is nearly $650,000,000. The cost per ton-mile for hauling on hard-surfaced roads should not exceed 13 cents. It is therefore evident that if our roads were adequately improved a large annual saving in the cost of hauling would result.

REASONS FOR STATE AID TO PUBLIC ROADS.

Under the system of local management which succeeded the toll systems and the road-building activities of the Federal Government, tax burdens for road purposes rested almost entirely upon farm property. Since the cities generally escaped these responsibilities and burdens, this condition was inequitable, produced inadequate revenue, and

resulted in a very widespread stagnation in the building of improved roads. A further inequity resulted from the fact that traffic in its development took no account of county and township boundaries, so that frequently the traffic from one county destroyed the roads of another county, which in turn found itself unable to obtain redress. Modern traffic gave rise to new and difficult problems of construction, which the limited skill of local officials was unable to solve. Road taxes were, to a great extent, worked out by untrained, undisciplined road hands; most of the road work consisted in patching from year to year, and little tangible progress could be shown for the money and labor expended. These conditions rendered State action ultimately imperative, and New Jersey in 1891 was the first State to take definite action through legislative enactment. The law, which became operative in 1892, provided a State appropriation of $75,000 to aid road building in the counties, and placed the administration of the law in the State board of agriculture. In 1894 the administration of the law was placed in the hands of a State commissioner of public roads. Other States rapidly followed the precedent set by New Jersey, and this progress was greatly accelerated by the advent of the automobile. This new traffic soon became a source of revenue for road purposes through the payment of registration fees. It subjected stone-surfaced roads to exceptionally destructive wear, and thus emphasized the need for skilled management of construction and maintenance; caused a persistent demand and agitation by automobile owners for an efficient system of highways; and for these several reasons materially seconded the primary causes already cited as responsible for State action. The 1,800,000 automobiles now registered in the United States are paying more than $12,000,000 annually in registration fees.

PROGRESS OF STATE ROAD MANAGEMENT.

Of the progress of State road management it may be said that 42 States have thus far established highway departments for educational or administrative work, and of these 30 have made actual appropriations in aid of road construction or maintenance. In all, $208,000,000 had been appropriated from State funds between 1891 and

January 1, 1915, for construction, maintenance, administration, and educational road work, and a total of about 31,000 miles of improved roads is the evidence to show that this expenditure was not in vain. These roads were built for the most part as a joint State and local undertaking, so that a large local outlay not included in the State total was involved. It is most gratifying, however, that within a period of 22 years a policy, begun on a small scale and cautiously extended, has produced a mileage of improved roads greater in extent than the entire "Routes Nationale" of France, and that in 1913 alone a total of 5,000 miles of State-aided roads were completed.

HISTORY OF THE STATE-AID POLICY.

The rapid and widespread acceptance of the policy of State participation in road improvement may be understood by a hasty chronological narrative. Following the action of New Jersey in 1891, similar legislation was enacted by Massachusetts and Vermont in 1892, Connecticut and California in 1895, Maryland and New York in 1898, Maine in 1901, Rhode Island in 1902, New Hampshire and Pennsylvania in 1903, Ohio in 1904, Idaho, Michigan, Minnesota, and Washington in 1905, Virginia in 1906, Arizona, Colorado, New Mexico, Utah, and West Virginia in 1909, Louisiana in 1910, Alabama and Wisconsin in 1911, and Oregon in 1913. North Carolina in 1901 authorized the State geological survey to conduct educational and research work as a State highway department, and has continued on this basis up to the present time, except for the authorizing of a portion of its State convict force to be used on roads under the direction of the State geological survey. Delaware in 1903 provided for State aid, but only one county out of the three utilized the aid granted. Iowa established a highway department in the State agricultural and mechanical college at Ames in 1904 for educational and research work, and in 1913 the law was very much broadened by the creation of a State highway commission having control over all road work in the State.

Illinois established a highway department in 1905, which was restricted to educational and investigative work and the distribution of crushed stone prepared by State con-

victs. In 1913 the Illinois law was greatly broadened and actual State aid in the form of a State road levy was granted. Missouri established in 1907 a highway department for educational and investigative work, but the State has distributed considerable sums of money to the various counties for road purposes, from a war debt paid to the State, automobile license taxes, and corporation taxes. Georgia in 1908 provided for the granting of State convict labor to road improvement, with the actual work under local supervision. North Dakota established an educational highway department in 1909, but has made no appropriation for actual aid. Kansas and Oklahoma established State highway departments for educational purposes in 1911, and Oklahoma gave authority for the use of State convicts on public roads. In the same year Nebraska provided aid for bridges and later required that bridges costing over $500 shall be designed and built from plans and specifications prepared by the State engineer. Legislation was also enacted providing for an advisory State highway commission. Nevada and Wyoming in 1911 made appropriations for the use of convicts in road construction under the direction of the respective State engineers. Kentucky established a highway department for educational work in 1912, and the law was amended in 1913 to provide State aid by a one-half mill tax levy. Arkansas established a highway department for educational work in 1913. At the present time only the States of Florida, Indiana, Mississippi, South Carolina, Tennessee, and Texas have no provision for any sort of State participation in road work.

CLASSES OF STATE-AID SYSTEMS.

The systems of road management now prevailing in the various States may be grouped in six general classes. The first class comprises those States in which the construction of all roads is more or less under State control. In the second class are comprised those States in which State control of road construction is limited to those roads on which State funds are expended. In the third class are included the States which grant aid in the form of State funds, but allow the expenditure to be made under local control. In the

fourth class are those States which have established highway departments for educational and advisory work. The fifth class is composed of the States which devote the labor of State convicts to road improvement, and the sixth class comprises those States in which the control of all road construction is entirely local. The accompanying chart (fig. 11) graphically illustrates this classification of the States. In the matter of road maintenance, the States may be conveniently classified in four groups. In the first group are comprised those in which the control of the maintenance of all roads rests with the State. In the second class are those in which the State control of road maintenance is restricted to the roads on which State funds are expended for construction. In the third class the State requires that roads on which State funds have been expended shall be maintained, but leaves the actual maintenance to be performed under local control and with local funds. In the fourth class are included the States which make no specific provision for the maintenance of roads on which State funds have been expended. The remainder of the States are those in which maintenance is an entirely local matter and under local control. These classes are illustrated by a graphic chart (fig. 12).

STATES LEADING IN STATE-AID WORK.

Of the States which, for magnitude of expenditures, mileage of roads constructed, and comprehensiveness of system, stand out most prominently, several have been selected for individual mention, so that the reader may obtain a more intimate knowledge of the operation of the policy of State management.

Massachusetts, which established its highway department in 1892, had expended out of State appropriations to January 1, 1914, about $14,000,000, had completed more than 1,000 miles of State highway, and had aided in the improvement of more than 350 miles of small-town highways. The State obtains its funds for road work through the issuance of State bonds and the levying of automobile license taxes. In constructing the system of State highways the entire cost is borne in the first instance by the State, but the counties are required to repay to the State 25 per cent of the cost. The

FIG. 1.—VIRGINIA STATE-AID ROAD, TAR [illegible] AND G[illegible]

FIG. 2.—MICHIGAN STATE-REWARD ROAD, MACADAM.

FIG. 3.—NEW JERSEY STATE ROAD, BITUMINOUS MACADAM.

FIG. 1.—OHIO STATE HIGHWAY, BRICK.

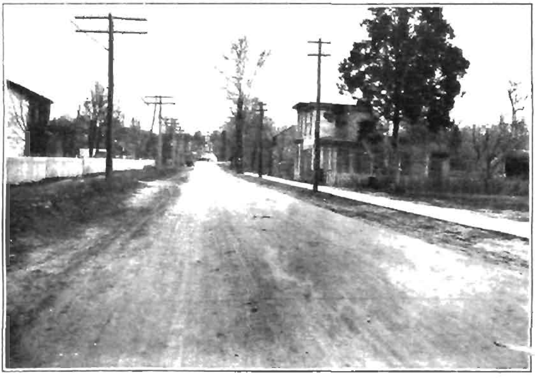

FIG. 2.—MARYLAND STATE HIGHWAY, CONCRETE.

motor-vehicle fees are applied entirely to the maintenance of State highways and improvement of small town roads.

Connecticut, which established its highway department in 1895, had expended to January 1, 1914, about $11,500,000,

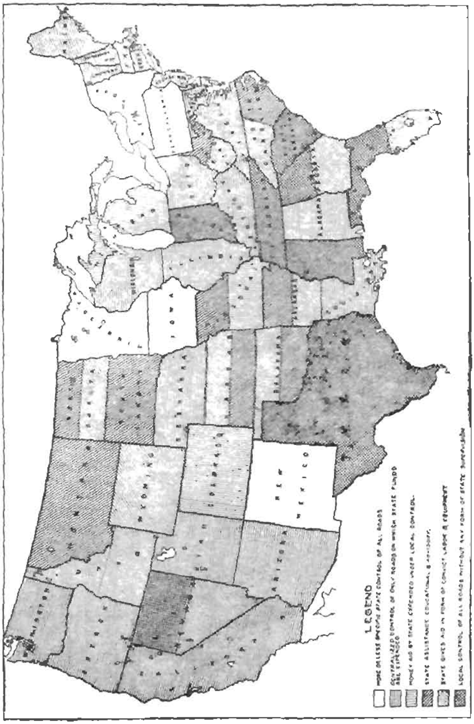

FIG. 11.—Classification of State systems of road management. Construction

a portion of which was derived from the sale of State bonds. The aid granted by the State varies according to the taxable valuation of the towns, but has been usually from three-

fourths to seven-eighths of the cost of the roads on which the State has granted aid. Like Massachusetts, the Connecticut system provides for the application of automobile revenues to road maintenance.

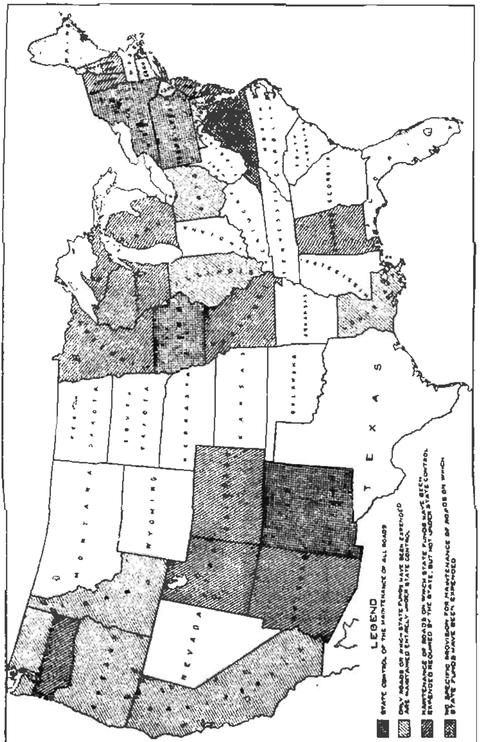

FIG. 12.—Classification of State systems of road management. Maintenance.

New York established its highway department in 1898 and expended some $25,000,000 of State funds additional to the

authorization in 1906 of the first State bond issue of $50,000,000 for road construction. A second State bond issue was authorized in 1912, amounting to $50,000,000. This provided a total of $100,000,000 through the issuance of bonds for the building of a system of State and county highways. The system as laid out divides the highways into four classes, namely: State highways, to be improved and maintained solely at the expense of the State; county highways, to be improved and maintained at the joint expense of the State, county, and town; county roads, improved and maintained by the county; and town highways, improved and maintained by the town with the aid of the State. The bond issue was originally intended for the improvement of a system of county highways aggregating 8,380 miles, and to this was added a system of State highways of 3,617 miles. Approximately 4,300 miles of the State and county system were completed up to January 1, 1914, with a total outlay of State funds aggregating $67,155,000.

Virginia has made rather remarkable progress, largely in the building of cheaper types of road than have been constructed in New York and the other Eastern States. (See Pl. XV, fig. 1.) The Virginia department was established in 1906 and had expended out of State funds to January 1, 1914, a total of $1,663,000. To show for this outlay, the State reported for the same period a total of 2,052 miles of road constructed under State supervision. Under the Virginia plan the local contribution comprises one-half of the total cost, but many of the counties accept State convict labor in lieu of money aid from the State. The law also provides that bond issues shall be expended under the direction of the State highway department. The total mileage of roads constructed under the direction of the Virginia department exceeds the total reported by any State except New York and Michigan, and as the latter State grants aid on local roads only to the extent of a small reward or bonus, the mileage reported would not be comparable on the same basis as the mileage reported by the Virginia department.

Ohio established its highway department in 1904 and constructed to January 1, 1914, a total of 578.29 miles at a total contract cost of $4,847,768, or an average of $8,383 per mile. Under the present law the State levies a tax of one-half mill, which provides an annual revenue of about

$3,500,000. In the expenditure of this fund the counties, townships, and abutting property owners must provide an equal amount, so that the annual outlay under the direction of the State highway department is now approximately $7,000,000. A system of intercounty highways has been laid out connecting all of the county seats in the State, and this system is rapidly being improved and maintained under the direction of the State highway department.

Maryland is engaged in the construction of a system of State highways about 1,285 miles in length, to be constructed and maintained entirely at the expense of the State. Bonds have been issued and authorized by the State to provide the necessary funds. The total thus issued and authorized to January 1, 1914, amounted to $9,170,000. During 1914 additional issues were authorized, bringing the total up to something like $15,770,000, and it is estimated that the entire system will cost approximately $18,000,000. The total mileage of the State system completed to January 1, 1914, aggregated 490 miles. (See Pl. XVI, fig. 2.) The State has been granting aid toward the improvement of roads since 1898, and the total of roads completed on which the State has paid a part or all of the cost to January 1, 1914, aggregates 1,430 miles.

New Jersey, which has the distinction of being the first State to adopt the policy of State aid, began its work in 1892 and had made a total outlay to January 1, 1914, of about $5,800,000. The State had completed during that period 1,833 miles of road, partly paid for out of State funds and partly by county funds. The State's contribution toward the total cost aggregates about 40 per cent. Revenues derived from the registration of motor vehicles are applied to the maintenance of the roads, and recently provision has been made for the laying out of a system of State highways similar to the plan adopted in many other States.

Wisconsin, which has been operating under a State-aid plan since 1911, follows a system somewhat local in character, under which the boards of county commissioners are required to select "a county system of prospective State highways." These roads are constructed by the town, county, and State jointly, each paying one-third of the cost, or a county can assume two-thirds of the cost and the State one-third. The

improvements are made under the direction of a county highway commissioner selected by the county board, under the general direction and in accordance with plans and specifications of the State highway commission. The first appropriation made by the State was $350,000 in 1911, and a similar amount in 1912. For 1913 the appropriation was increased to more than $800,000, and for 1914 to $1,230,000. Under the joint township, county, and State plan more than $4,300,000 is available for 1914. That rapid progress is being made is indicated by the fact that 996 miles of road were constructed during the year 1913, bringing the total constructed under the direction of the State highway department to 1,436 miles.

California has undertaken to construct a system of State roads comprising two trunk lines traversing the State from north to south, and a system of laterals connecting the county seats with a trunk-line system. A State bond issue, amounting to $18,000,000, was authorized in November, 1910, and the work of constructing this State system is now well under way. State highway bonds to an aggregate of $5,200,000 were sold to December 31, 1913, and contracts had been awarded for the construction of 356 miles of highway, estimated to cost about $2,900,000.

STATE HIGHWAY PROGRESS.

A graphic chart (fig. 13) accompanies this article, showing State highway progress to January 1, 1915. It embraces the three factors of time in operation, total State expenditures, and mileage of roads completed with the aid of State funds. This chart gives a fairly intelligent conception of the progress made in various sections of the country. So wide a variation exists, however, in the traffic conditions prevailing in respective States, and in the types and dimensions of roads constructed, that a comparison based merely upon mileage and expenditures fails to convey more than a general conception of the progress accomplished. Furthermore, the outlay of State funds carries with it in the respective States widely differing proportions of local expenditure as a condition to the State outlay, and this again renders a comparison difficult. Construction costs should, therefore, be considered entirely independent of the graphic showing of progress

made. The cost of a road is dependent upon not only the type of construction, but the amount and character of grading to be done, the cost of labor and materials, the width and thickness of surfacing, the character and amount

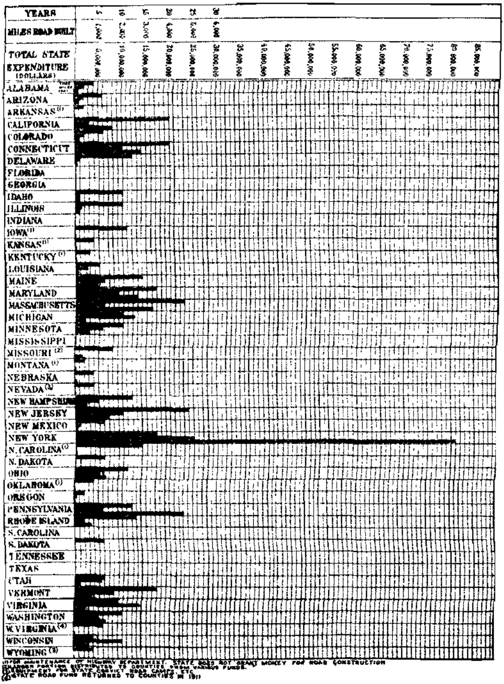

FIG. 13.—Chart showing State highway progress.

of drainage required, and other factors of equal variability. Based upon general averages, however, it has been ascertained that under average conditions macadam roads can be built in southern States at from $4,000 to $5,000

per mile, gravel roads at from $1,500 to $2,500 per mile, and sand-clay and topsoil roads at from $800 to $1,500 per mile. In New England and the other eastern States, macadam roads are reported at from $6,000 to $9,000 per mile, gravel roads at from $3,200 to $5,000, and bituminous macadam from $8,000 to $13,000, according to the character of construction, whether surface-treated, penetration, or mixing method. The bituminous type is quite general in the eastern States. (See Pl. XVI, fig. 3.) As indicating costs in other sections of country, the State Highway Commissioner of Michigan reported in 1913 the average cost for macadam roads $4,300 per mile (see Pl. XV, fig. 2), clay-gravel roads $1,500 per mile, and concrete roads about $10,000 per mile. The average cost of State highways constructed in Ohio in 1913 was $8,383. According to types, in 1912 the brick-paved highways averaged $14,650 per mile (see Pl. XVI, fig. 1) and the macadam highways $5,950. In California the first 356 miles of the State system of highways cost an average of $8,143 per mile and consisted principally of thin concrete with a thin coat of bitumen. The maximum and minimum figures given in this paragraph are not absolute, but are intended to present the usual range of costs. The rates given include grading, drainage, surfacing, and engineering costs.

EFFICIENCY OF STATE ROAD MANAGEMENT.

The efficiency of State road management has been impaired in some of the States through the influence of politics. Changes of administration have brought about upheavals which have proven prejudicial to the efficient and economical administration of the highways. This condition is gradually being remedied through the placing of nonpartisan commissions in charge of State highway departments, so that in the appointment of highway engineers and their assistants political considerations shall have no weight. Furthermore, competent engineers may be attracted to the work by the realization that they will not be disturbed in office so long as they render efficient service.

MAINTENANCE.

In the early stages of State road management little or no provision was made for the maintenance of roads constructed with the aid of State funds. This condition has developed

into a serious problem, and many of the States are finding it difficult to obtain sufficient funds to resurface and properly maintain the large mileage of roads already constructed. It was thought at first that if the States aided in the construction of roads the counties could be depended upon properly to maintain them. This has been found to be a case of misplaced confidence, and the only way in which the States could obtain proper maintenance was to place the work under the immediate direction of a State highway department. Automobile revenues are for the most part applied to the maintenance of roads, and many of the States are providing annual cash appropriations in sufficient amounts properly to meet existing conditions.

STATE CONTROL.

The realization has become quite general that, in order to render maximum service, State highway departments should be given some measure of control over the construction and maintenance of local roads. For this class of roads an amount exceeding $160,000,000 is expended annually, with comparatively little result to show in the form of improved road mileage for this great outlay. The State of Iowa has met this situation by placing all the road work in the State under the direction of the State highway department.

Traffic is increasing so rapidly as to cause excessive wear upon the roads, especially in the vicinity of congested centers of population. This results in a heavy annual maintenance cost, averaging in the large eastern States not less than $750 per mile per annum. Many experiments have been made in the effort to devise types of road which can be maintained at relatively low cost. Thus far, aside from the cheaper forms of construction, the States are depending upon the various forms of bituminous macadam, concrete, and vitrified brick road.

ESSENTIAL FEATURES OF SUCCESSFUL STATE MANAGEMENT

Summarized briefly, the essentials to successful State highway administration, as demonstrated by the experience of the various State highway departments, are as follows: (*a*) The elimination of politics as a factor in State highway work;

(*b*) the control by the State highway department of all work on which State funds are expended; (*c*) adequate appropriations for continuous maintenance of highways under efficient supervision from the day the highways are completed; (*d*) State supervision as to surveys, plans, and specifications of roads and bridges constructed under bond issues, and supervision of such other road and bridge work as requires considerable cash outlay and the exercise of engineering skill and knowledge.

Highly desirable progress toward the attainment of efficiency in State highway management could be accomplished by a general revision of State road laws, so as to eliminate all obsolete and conflicting legislation and to reduce the really essential laws to a few simple, clear-cut statutes which would define duties and responsibilities and provide ways and means for conducting highway work. A literal compilation of the road laws of the several States has already been made. This great mass of legislation exceeds 4,000,000 words. It is difficult to imagine conditions in any State which would necessitate more than 10,000 words to deal adequately with all phases of highway improvement. If this average were maintained for the 48 States, it is evident that without any loss whatsoever in efficacy 3,500,000 words could be wiped off of our statute books.

CONCLUSION.

State road management is a concrete manifestation of the universal demand of the age for efficiency and equity in the management of public affairs. Its advocates contend that only by State appropriations can the burdens of constructing roads of more than neighborhood importance be equitably apportioned; that only by reaching such adequate sources of revenue as are possessed by the State can sufficient funds be obtained to improve the roads commensurate with their importance; that only through the establishment of a State highway department can the best engineering and practical ability be obtained for the benefit of the entire State, as by any other plan only the wealthier counties could afford to obtain such assistance; that through this centralized management correlation of road work throughout the State may be obtained and the influence of local politics in some degree

eliminated or modified; and that standardization as to methods, costs, and administration may be greatly promoted by such centralized control. It must be said as evidence of the efficiency of this system that no State is on record as having permanently abandoned the policy once it has been adopted. The whole development of State road management has been toward a larger measure of participation by the State through increased appropriations and more comprehensive State supervision.

APPLE SIRUP AND CONCENTRATED CIDER: NEW PRODUCTS FOR UTILIZING SURPLUS AND CULL APPLES.

By H. C. Gore,

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TWENTY-FIVE per cent of the apples grown in American orchards never figure in the food supply of the nation, according to estimates of specialists who have been studying apple production. These waste apples are either good fruit for which the farmer can find no profitable market and therefore allows to rot under the trees, or surplus culls, left undisposed of after all demands for vinegar and fresh cider have been met. Food conservationists who have long been studying the problem of reducing this waste are inclined to attribute the loss of good fruit, in some measure at least, to defects in existing marketing systems and the failure of orchardists to avail themselves fully of cold storage as a means of keeping fruit from the season of plenty to the season of scarcity and better prices. The problem, however, of turning the culls and the apples too small for retail sale into profit seems to call not for improved marketing conditions but for the transformation of this material into new forms of food.

Although cider making calls for a comparatively inexpensive equipment and involves low labor cost, the mere making of fresh cider will not solve the problem. Cider is so perishable that its sale is possible only over a limited period and its principal consumption is during the holiday season. Moreover, fresh cider sells for so low a price and is so bulky that even if it kept well, long-distance shipment of it from the apple fields to the large cities is not profitable. Some of the cider, of course, is converted into vinegar, but the market for vinegar, again, is limited, and vinegar making involves a long period of storage and care and a consequent tying up of capital. Before large additional quantities of

cider could be made with profit, therefore, methods of reducing its bulk and of changing it from an article which spoils quickly into one which will keep over a large portion of the year had to be devised.

In the past experiments were largely directed toward attempts to sterilize cider by means of heat. It is simple enough to sterilize cider in this way so that it will keep, but unfortunately the use of sufficient heat to make a stable product destroys the delicate flavor of the fresh juice and makes the product unappetizing. Heated cider has a distinctive cooked taste and can be used only in limited ways, principally in cookery, where it has a certain value.

The problem, therefore, was still unsolved when a series of apple crops larger than the average resulted in an even greater waste than usual and stimulated the Department of Agriculture to institute systematic studies into methods of treating apple juice.

A natural phenomenon, namely, the action of a barrel of cider when allowed to freeze on the farm, suggested that the solution lay here rather than in heating the juice. It was observed that where a barrel of cider was allowed to freeze under natural conditions, the ice formed in a fairly solid mass around the outer sides of the barrel, leaving a core of nonfrozen cider which possessed in concentrated form the flavor of the cider, but which contained a far less proportion of water. The outer ice, on the other hand, was mostly water with a very low content of sugar and other solids. Examination of this inner core of unfrozen cider showed that it contained large enough amounts of natural acid and sugar, which act as preservatives, to warrant the belief that concentrated cider would keep longer than ordinary cider and could be marketed after the regular season was over.

The next step was to duplicate as nearly as possible this natural process. By properly governing the freezing method, however, it was found that a more complete separation of the water from the sugar and other apple solids could be obtained. After some experiments, the cider was frozen solid and the ordinary centrifugal machine long used in the sugar industry was employed as a convenient instrument to separate the sirupy portion of the cider from the water-

ice by means of rapid whirling. This process, it was found, permitted the reduction of 5 gallons of cider to 1 gallon of cider concentrate, which preserved all the original flavor of fresh cider and could be instantly restored to cider by the simple addition of the water that had been extracted. This product, it was seen at once, was so reduced in volume and weight as to make shipments from apple orchards to the large cities profitable for much longer distances. Laboratory tests bore out the theory that in its concentrated form the cider would keep much longer than in its original condition and, in cold storage, would keep indefinitely. The new product thus promises to make fresh cider available at soda fountains throughout the summer months.

The next step was to develop this laboratory method so that it could be used commercially in the way described later in this article.

In the meantime, however, having succeeded in concentrating cider to a sirupy consistency, the department began experiments to determine whether it was not possible to make from fresh cider table sirup, which would be a palatable and valuable food and would keep indefinitely in sealed containers, like the sirup made from cane or sorghum. Experiments in boiling the cider concentrated by freezing gave a stable sirup which, however, had a distinctly acid flavor as well as a cooked taste. This, it was thought, might militate against its use on the family table. The problem, it was seen, was to devise a means of removing the excess of acid, known technically as malic or apple acid, from the apple juice without injuring the value of the sirup.

After experiments with various methods of eliminating or reducing the acid, it was found that cider to which carbonate or milk of lime had been added could, after settling or filtering, and boiling, yield a stable and attractive table sirup with a fine flavor. After a year of experiments, conducted in 1914 on a laboratory and factory scale, it was found that it was possible to make this sirup, as later described, in small quantities in the home with ordinary utensils, and that the product when made on a larger scale promised to offer a profitable by-product to steam-power cider mills in regions where there is a large surplus of apples.

METHOD OF MAKING APPLE SIRUP ON THE FARM.

The simplest method of making apple sirup developed by the laboratory is such that the average farm housewife who is provided with a large preserving kettle can readily make a few quarts of the product in her own kitchen. Although she may not find that she can sell her product profitably, she at least will find the method valuable in converting the windfalls of her own farm into a delicate and pleasant sirup for the use of her own family. The method is as follows:

To make 1 gallon of apple sirup, stir into 7 gallons of apple cider 5 ounces of powdered calcium carbonate (carbonate of lime), which is a low-priced chemical, readily obtainable from a local drug store in the form of precipitated chalk or powdered marble-dust. Heat the cider and allow it to boil for a few minutes. As the cider will foam slightly, it is necessary to use a vessel at least one-third larger than the volume of cider. Where a large vessel is not obtainable, the cider may be boiled in batches. Pour the cider, after boiling, into vessels, preferably tall glass pitchers or preserving jars, which permit the condition of the liquid to be observed. Allow the liquid to settle until perfectly clear. This will take several hours or overnight. After the liquid is perfectly clear and shows a distinct sediment at the bottom, pour off the clear portion into the preserving kettle, being careful not to pour off any of the sediment. Add to the clear liquid a level teaspoonful of the carbonate of lime and again stir thoroughly. The process is completed by boiling down the clear liquid. Inasmuch as the liquid when boiling down foams more than on the first heating, the kettle should be only one-third full when boiling commences. Where a large kettle is not obtainable, the liquid will have to be boiled down in batches. Allow the liquid to boil rapidly. If the housewife has a candy thermometer, she should allow the liquid to boil until it reaches 220° F. Where no such thermometer is at hand, boil the liquid until it reaches about one-seventh of the original volume, or until a small portion when cooled rapidly and poured from a spoon shows about the same consistency as maple sirup. The aim is to make a thin sirup rather than one that will candy.

When the sirup has reached this point, pour it off into the pitchers or fruit jars and let it stand where it will cool very

slowly. Slow cooling is very important in making the sirup clear, as it allows all sediment and added substances to settle out completely. A convenient way of bringing about this slow cooling is to put the vessels into a fireless cooker or to put the jars or pitchers containing the sirup in a wash boiler, surround them with hot water, and allow the whole to cool. When the sirup has cooled to room temperature there will be found a white sediment, which is known to chemists as malate of lime, a harmless compound of the lime and the acid of the apples. This is identical with the product known as maple sand, which occurs naturally when maple sap is boiled down into sirup. When the settling has been completed, carefully pour off the clear portion of the sirup into a kettle, heat nearly to boiling, and pour hot into sterilized fruit jars, which should be at once sealed as in preserving. Another method would be to pour the sirup cold into the bottles or jars and sterilize and seal just as with fruit. Inasmuch as the sediment at the bottom in no way affects the sirup, those who prefer may at once transfer the boiling sirup from the preserving kettle into sterilized jars or bottles, and seal immediately. When using the sirup, simply pour off the clear portion, leaving the sediment, which is not easily disturbed, at the bottom.[1]

The housewife who has made this sirup will find that she has a clear ruby-colored product possibly varying from a deep ruby red to lighter shades, according to the character of apples used in making the cider. This sirup, which is similar in consistency to maple sirup, can be used like any other table sirup. If made in accordance with these directions it will have a delicate and novel flavor, somewhat similar to that of the sugar which forms when apples are baked. It will be found that children will enjoy it on bread and butter and that it will afford a new and useful flavoring adjunct or sauce for puddings or other desserts.

For the convenience of housewives the Office of Nutrition Investigations, of this department, has developed typical receipts for its use in cookery and in candy making. These receipts are merely suggestive and the housewife will find

[1] Those who wish to make a larger quantity of the sirup and avoid the delay and trouble of the first settling may run the cider, after the first boiling, through a milk separator, which, it will be found, will remove the sediment, which will cling to the inside of the bowl of the separator. The clarified cider then is boiled down, as in the settling method.

many other uses for it which will satisfy the special tastes of her family.

Graham Muffins.

1¼ cups graham flour.
1 cup flour.
1 cup sour milk.
½ cup apple sirup.
¾ teaspoon soda.
1 teaspoon salt.
2 tablespoons melted butter.

Mix and sift dry ingredients; add milk to the sirup, and combine mixtures; then add butter. Bake in hot oven in buttered gem pans 25 minutes.

Boston Brown Bread.

1 cup rye meal.
1 cup granulated corn meal.
1 cup graham flour.
¾ tablespoon soda.
1 teaspoon salt.
¾ cup apple sirup.
2 cups sour milk, or 1¾ cups sweet milk or water.

Mix and sift the dry ingredients; add the other ingredients. Mix thoroughly and steam in a buttered mold for 3½ hours.

Dark Fruit Cake.

½ cup butter.
¾ cup brown sugar.
¾ cup raisins, seeded and cut in pieces.
¾ cup currants.
½ cup citron cut in strips (or candied orange peel).
½ cup apple sirup.
2 eggs.
½ cup milk.
2 cups flour.
½ teaspoon soda.
1 teaspoon cinnamon.
½ teaspoon allspice.
¼ teaspoon mace.
¼ teaspoon cloves.
½ teaspoon lemon extract.

Follow directions for mixing butter cake mixtures. Bake in deep cake pans 1¼ hours.

Walnut Bars.

¼ cup butter, or 2 tablespoons butter and 2 tablespoons lard.
2 tablespoons boiling water.
¼ cup sugar.
¼ cup apple sirup.
½ teaspoon soda.
1½ cups flour.
½ teaspoon salt.
1½ teaspoons cinnamon.
Chopped walnut meats.

Pour water over butter (and lard if used), then add sugar, sirup mixed with soda, then flour, salt, and spices. Chill thoroughly, roll ¼ of an inch thick, cut in strips 3½ inches long by 1½ inches wide. Sprinkle with nut meats and bake 10 minutes.

Apple Sirup Custard.

¼ cup apple sirup.
1¾ cups milk.
2 eggs.
¼ teaspoon salt.
½ teaspoon vanilla.
2 tablespoons sugar.

Beat the eggs just enough to mix the white and the yolk. Add the other ingredients. Bake in cups in a slow oven 50 minutes. If the custard is to be baked in one dish, use 3 eggs.

SAUCE FOR ICE CREAM.

1 tablespoon butter.
1 tablespoon cornstarch.
½ cup apple sirup.

Mix together the butter and cornstarch and cook them thoroughly, being careful not to burn them. Add the sirup and cook the mixture until it hardens when dropped into cold water and until all taste of the raw cornstarch is gone. Pour hot over the ice cream.

PUDDING SAUCE.

To the above recipe add ½ cupful of water with the sirup.

CANDY.

1½ cups sugar.
¼ cup water.
3 tablespoons apple sirup.
1 egg white.

Cook together the water and the sugar without stirring until it reaches a temperature of 248° F. This is known as the "hard ball stage," at which a little of the sirup dropped into water forms a hard ball. Add the sirup and reheat. Pour this sirup into the well-beaten white of an egg and beat until the mixture will hold its shape. Drop by teaspoonfuls on a buttered paper.

MANUFACTURE OF APPLE SIRUP ON A COMMERCIAL SCALE AS A BY-PRODUCT OF A STEAM-POWER CIDER MILL.

During the apple-harvesting season of 1914 the department tested out the possibilities of making apple table sirup on a commercial scale in cooperation with a steam-power cider mill at Hood River, Oregon. Every effort was made to use methods and appliances which could readily be installed by the average steam-power cider manufacturer who would be willing to invest in some additional equipment. In this experiment 140 gallons of the sirup were manufactured. The process has been made the property of the American people through an application for a public-service patent, which leaves any American citizen at liberty to use the method.

The extra equipment which was found necessary for a steam-power cider mill is: A small steam pump, a plate-and-frame filter press, a small milk cooler or similar cooling device, a 500-gallon settling tank, a 500-gallon receiving tank, and a 500-gallon boiling tank equipped with 30 feet of 2-inch steam coil. In addition there will be required facilities for handling the finished sirup. (Fig. 14.)

In the commercial making of the apple sirup it was found that milk of lime, when properly made up and used, gave more satisfactory results in neutralizing the malic acid of the cider than does the carbonate of lime.[1] Carbonate of lime is recommended for making the sirup in the home, be-

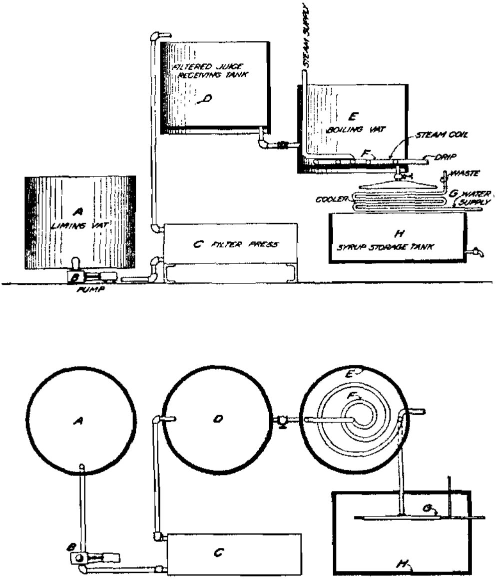

FIG. 14.—Liming vat, steam pump, filter press, receiving vat, boiling vat, steam coil, cooler, and storage tanks used in making apple sirup at a steam cider mill.

cause its use does not necessitate certain chemical tests required in making the sirup on a large scale. These tests, however, are such as any manufacturer of vinegar could

[1] Milk of lime, like carbonate of lime, when added in proper proportion to fresh cider combines with the malic acid of the juice to form a fairly insoluble substance known as malate of lime. This is the white substance which crystallizes out during evaporation and later sinks to the bottom of the storage or settling vat.

make and no more complicated than the usual tests made at creameries for determining the acidity of milk.

After the cider has been collected in the first vat, its natural acidity is tested by the method indicated.[1] A gallon of properly prepared milk of lime is then stirred in with a wooden paddle. A sample of the cider is then tested to determine the degree to which the lime has neutralized the acid. More milk of lime is added until the test shows that the cider is nearly but not quite neutralized. The successive tests should not be neglected, as it is very important that the addition of lime stop before the cider is rendered alkaline, which will ruin it for sirup making. Proper preparation of the milk of lime is essential for success.[2]

When the juice has been neutralized to the proper point, stir into it 17.5 pounds of finely bolted, high quality infusorial earth to each 100 gallons of neutralized cider. The purpose of this infusorial earth is to assist in filtering the product, which is the next operation.[3]

The neutralized cider, with the infusorial earth, is then pumped by a small steam pump through a plate-and-frame filter press. This press is a series of deeply corrugated plates

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[1] The following method is convenient in testing:

Reagents.—*a*) Tenth-normal sodium hydroxid; (*b*) an alcohol solution containing about 1 per cent of phenolphthalein.

Apparatus.—A graduated 50 cc burette, burette stand, a 10 cc pipette, and a glass cup or tumbler.

Procedure.—Transfer 10 cc of cider to the glass cup, add a few drops of phenolphthalein, and run in the alkali from the burette until a faint pink color remains after mixing. Note the amount of alkali required to produce the color. Ten cubic centimeters of fresh cider usually require about 8 cc of tenth-normal alkali. The vat of cider should be limed until a 10 cc portion requires from 0.4 to 0.8 cc of alkali.

[2] Unslaked lime containing less than 1 per cent of magnesium, a quality readily obtainable, should be employed. The lime should be "fat"; that is, should slake quickly to form a smooth paste practically free from coarse particles. In slaking the lime add several volumes of water, being careful not to "drown" the lime. If water is added in too large a quantity the lime will become cold and not slake to a cream. After slaking, let the mixture cool down, and then, with the addition of more water, work it to a thin cream and strain this through a fine wire screen to remove coarse particles. Freedom from coarse particles is essential, as these if present would sink to the bottom of the vat and continue to act and render the juice alkaline.

[3] Infusorial earth, also called diatomaceous earth, or kieselguhr, consists of nearly pure silica built up of the skeletons of microscopic sea animals called diatoms. When crushed and bolted it therefore exposes an enormous surface to liquids with which it is mixed. It possesses the property of opening up the slime which collects on the filter cloths, which otherwise would choke and render filtration impossible. Infusorial earth possesses this property to an extent not possessed by any other known substance. At the same time it is so inert that neutral or acid substances can be filtered through it practically without contamination. It is extensively mined in the United States, and may be had finely bolted, ready for use in filtering, in carload lots at less than 2 cents a pound.

covered with filter cloths and separated by frames in such a way that the juice passes through the filter cloths, leaving the suspended matter on the surface of the fiber. Upon experiment it was found that the juice, unless treated with infusorial earth, quickly clogged up the filter press. Infusorial earth retards clogging and permits the rapid filtration of the product. When filtration becomes slow, the cloths should be changed.

The filtered juice is then delivered into a 500-gallon receiving vat, whence it can be drawn as needed into the evaporating vat. As the liquid foams considerably on boiling, the vat wall should be at least 3 feet higher than the surface of the liquid. The evaporating vat should be provided with a flat spiral of 2-inch block tin or silver-surfaced copper pipe, having at least 30 linear feet of effective heating surface. With a steam pressure of from 60 to 90 pounds, this coil will reduce 125 gallons of limed cider to a sirup in about 1½ hours. The boiling is continued until the thermometer registers about 220° F. The steam is then shut off and the sirup is discharged through a valve in the bottom of the vat. The boiling should not be prolonged more than 2 hours, and for this reason it is wise not to introduce more than 125 gallons of juice into a vat equipped with a coil of this size.

The hot juice is passed over a small milk cooler or a series of pipes through which cold water flows, and from the cooler into the settling vat. The purpose of this is to reduce the sirup quickly to a temperature of about 160° F. If the sirup were put at a boiling temperature into the settling tank, it would cool very slowly and undergo serious changes in flavor. At the same time, the preliminary cooling should not be carried too far, because if the juice is suddenly cooled much below 160° F., the separation of the malate of lime formed from the milk of lime and the malic acid of the juice will be retarded and the excess of malate of lime will remain in the sirup, giving it an acrid taste.

In the storage vat the sirup is allowed to cool slowly and settle. At the end of a few days it will be found that the malate of lime has settled to the bottom of the tank in a compact layer, leaving the sirup quite clear. The more time allowed for settling, the clearer will be the sirup. When

the sirup has settled sufficiently, it is drawn out by means of a tap placed above the sediment line, or siphoned off, into bottles or other containers. To insure sterilization it may again be brought to the boiling point and put while still hot into containers and sealed, or other common methods of sterilizing such products in containers may be followed. If the settling has not been complete, the sirup after being reboiled and allowed to stand may show a slight sediment of malate of lime, which is similar to the maple sand of maple sap. The sirup can be again poured off from the sediment, or the sediment, which does no harm, may be left in the container.

COST OF MAKING APPLE SIRUP ON A COMMERCIAL SCALE.

The cost of making apple sirup on a commercial scale, as nearly as the department can determine, is probably slightly greater than that of making sirup from cane or sorghum. The processes are essentially similar with the exception of the need for liming and filtering. No figures can be given as to the detailed cost of making the sirup in large lots, for the reason that but one factory run of 140 gallons has as yet been completed. In this run, coil heating was used and no experiments have yet been made with vacuum evaporating apparatus, or with direct heat evaporators which are widely used in converting cane and sorghum juice and maple sap into sirup. As 7 gallons of cider will make 1 gallon of sirup, with cider at 6 cents per gallon, the cost of raw material, exclusive of the lime and infusorial earth, is about 42 cents per gallon of sirup. The infusorial earth necessary to treat 100 gallons of juice should cost in quantity about 35 cents, and the lime for neutralizing not more than 5 cents, making a total cost of 40 cents for treatment of this quantity of juice. As 14.3 gallons of sirup are produced from this amount of juice, the treatment will add about 2.8 cents per gallon to the cost. This makes the cost of the sirup, exclusive of investment and depreciation charges, and of the fuel and labor which vary in different localities, about 45 cents per gallon.

It is not impossible that a by-product in the form of the malate of lime deposited from the juice may somewhat reduce the cost per gallon as given. From this malate of

lime acid malate of lime and malic acid can easily be prepared. The present supply of malic acid comes from Germany, where it is prepared from the mountain-ash berry. It is also obtained in the form of maple sand as a by-product of the maple sirup industry. At present malic acid finds a rather limited use in medicine and as a rare chemical, and it can not be stated positively whether a market for any large quantity can be developed. The substance, however, has a possible future, if it can be obtained in quantity, as an ingredient of a new type of baking powder.

CONCENTRATION OF SWEET CIDER BY FREEZING AS A FALL ACTIVITY FOR ICE AND COLD-STORAGE PLANTS IN APPLE SECTIONS.

During the apple-harvesting seasons of 1913 and 1914 the department experimented extensively on a commercial method of handling fresh cider so as to reduce its bulk to a point where longer shipment would be possible and also to secure a product that would keep better and could thus be sold over a longer period than is possible with ordinary apple juice.

Analyses show that ordinary cider contains from 12 to 14 per cent of solids, mostly sugars, which make up from 10 to 12 per cent, and malic acid. The remainder of the cider is water, which experiment quickly showed can be withdrawn by freezing. Replacing the water so removed with ordinary drinking water will restore the cider to its original quality.

After varied experiments it was found that 5 gallons of cider could be reduced by freezing and treatment to 1 gallon of sirupy cider concentrate. To test the keeping quality of the concentrated cider, it was kept under various conditions. It was found that while the concentrated cider would not keep indefinitely under household conditions, its larger percentage of sugars and acids kept it from fermenting as quickly as ordinary cider. When kept cool, as in a household refrigerator, concentrated cider, it was found, would not spoil for many weeks. When kept at or below 32° F. in cold storage it was found that concentrated cider could be kept from one season to the next and thus make fresh cider available as a beverage during the summer months. The

department made experiments on a commercial scale in concentrating apple juice by freezing during the apple-bearing seasons of 1913 and 1914. This work was done in connection with a cider mill located near a commercial ice-making plant in the apple-growing regions of Oregon. These experiments, in which the cider of over 4 tons of apples, or 600 gallons, was concentrated, seem to indicate that the product can be made at a cost which should yield an excellent profit to an ice plant during its slack season. The chief advantage to an ice plant, near an apple section, of freezing and concentrating cider as a by-product is that it will give it an activity at the very season when the demand for ice is greatly diminished because of the approach of cold weather.

The actual cost of the finished product will, of course, vary with the cost of the raw materials, rates of wages, and the actual cost of refrigeration, which, in turn, depends on the price of coal and other factors. The method calls for but slight additions to the equipment of the ordinary ice-making or cold-storage plant. The department is not ready to recommend the erection of freezing plants merely for the handling of the fall business of freezing cider, but recommends the process only to existing plants near large orchards which will find it a convenient filler and a means of reducing their overhead expenses through keeping their plant busy at an otherwise dull season. Moreover, as the product has not yet been marketed on a commercial scale, those undertaking the process should first satisfy themselves that they have a ready and convenient outlet for their product. A brief description of the manufacture of this concentrated cider on a commercial scale follows:

An ice-making plant was equipped with special 300-pound tin-lined freezing cans,[1] an ice crusher, a centrifugal machine, necessary machinery for handling the frozen cider, and containers for the finished product. (Fig. 15.)

The fresh cider is placed in the tin-lined ice cans and frozen in the brine tanks of the ice-making plant. For the first freezing the brine temperature should range between 10° and 20° F., which will freeze the cider into a solid mass in from 36 to 48 hours. The frozen cider is then loosened from the

[1] It is essential that tin-lined freezing cans be employed, as they resist the action of the cider successfully and are the cheapest form of freezing cans which will serve the purpose. Galvanized cans are quickly attacked by the cider and should never be used.

cans by removing it from the brine tanks, thawing it at the sides and bottom, and dumping it, just as ice is removed from the cans in ice making. The blocks of frozen cider are then passed through a power ice crusher which breaks them into pieces no larger than a walnut.

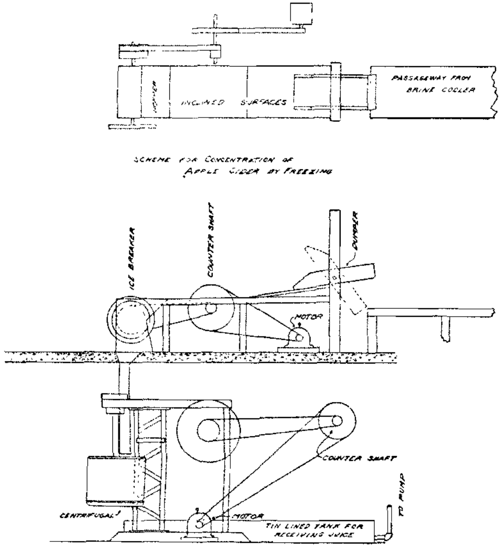

FIG. 15.—Dumper, ice breaker, and centrifugal machine used in crushing and centrifugalizing frozen apple juice.

The crushed frozen cider drops from the crusher into a standard sugar centrifugal machine which provides a mechanism for rapidly whirling it, and thus separating the sirupy part from the water ice, just as in the case of sugar, where the molasses is whirled off from the crystallized sugar. The frozen cider drops into the perforated metal basket[1] of the machine. This basket, which is whirled rapidly, causes the

[1] As the cider is very subject to metallic contamination, care should be taken to avoid using a centrifugal basket with brass lining. An unlined steel basket is satisfactory.

sirupy part of the cider to fly off from the mass of ice into the collecting chamber opening into the collecting tank below. A centrifugal operating at about the same speed used on sugar will separate most of the sirupy content from a charge of ice in three minutes.

The partially concentrated cider in the receiving tank is then put again into the freezing cans and refrozen at a temperature from 0° to 10° F., which will refreeze the sirupy cider in from two to three days. The refrozen cider does not become very solid and can readily be removed from the cans without thawing. It is passed through the crusher and again whirled in the centrifugal machine and reaches the receiving chamber as a fairly thick, somewhat viscous sirup. One gallon of this sirup represents 5 gallons of the original cider, which means that nearly 4 gallons of water have been removed by freezing and centrifugalizing.

As the ice remaining in the centrifugal basket still contains some of the sugar and solids of the cider, it may be removed from the basket by use of the unloader provided, allowed to warm up slightly, and again be run through the centrifugal machine. This will remove practically all the valuable material. As there will now be less than 1 per cent of apple solids left in the ice, it probably does not merit further treatment. The concentrate obtained on the second centrifugalizing of the ice is somewhat richer in solids than ordinary cider and may be added to the fresh cider or refrozen and treated as fresh cider.

The fully concentrated cider will be a somewhat thick liquid with the cloudy appearance and color of unfiltered fresh cider. If kept sealed at household refrigerator or in cold-room temperatures, it will keep for weeks. Where allowed to become warm, it will gradually ferment, but will spoil much more slowly than ordinary cider. Concentrated cider intended for use during the following spring or summer should be put into cold storage at once and kept at or below 32° F. It can be shipped anywhere in winter weather in unheated cars without danger of spoiling. It can be bottled, canned, or shipped in clean kegs. Inasmuch as 1 gallon can represents 5 gallons of cider and the equivalent of 250 gallons of fresh cider can be put in a 50-gallon barrel, the concentrated product can be shipped profitably for much longer

distances to market than can the bulky fresh cider. In addition to saving 80 per cent on the freight, the reduction in volume permits the shipper to use containers one-fifth the size, which is an important saving in cooperage. The saving in containers, which have always been relatively expensive items in shipping cider, should alone nearly offset the cost of freezing and concentration. In addition there is the saving of drayage and other handling costs. On its arrival at the market the retailer can at once restore it to cider by adding 4 parts of water, or he can sell it in the convenient concentrated form to his customers. Moreover, as has been explained, this cider, instead of fermenting on the journey, or a day or two after its arrival, will keep for two or three weeks in closed containers if not allowed to get warm and if kept closed in an ice box or refrigerator will remain in good condition for five or six weeks. The cider in its concentrated form is useful also as a flavoring sirup for desserts. When stored at low temperatures, the concentrated cider will keep indefinitely. In this way concentrated cider made in the fall can be kept over and used in the soft-drink trade during the hot months, at soda fountains, and in the home.

Those who wish to make a clear, brilliant cider concentrate can filter it by adding to the concentrated product 3 per cent or more by weight of infusorial earth, which should be thoroughly stirred in. This mixture can then be pumped through a plate-and-frame filter press, such as has been described in connection with the manufacture of apple sirup.[1]

COST OF CONCENTRATING BY FREEZING.

Until the process is well worked out on the commercial scale, statements of the probable cost of preparation are necessarily estimates only. The principal elements of cost are cost of raw material, cost of freezing, labor, power, interest, depreciation, and superintendence.

COST OF RAW MATERIAL.

Apples should yield at least 150 gallons of cider per ton. With apples at $6 per ton, allowing 2 cents per gallon as the

[1] It is well to paraffin the iron surfaces of the filter press before using it for filtering the cider concentrated by freezing, to lessen contamination with iron. This can be easily accomplished by heating the press with steam to above the melting point of paraffin and then rubbing on the paraffin, working it into the crevices with the aid of a brush.

cost of pressing, the raw material charge is 6 cents per gallon, or 30 cents per gallon of finished cider concentrated by freezing, on the assumption that the reduction in volume is 5 to 1.

COST OF FREEZING.

If the brine tanks of a modern ice plant can be used, the cost of freezing for the first time, including dumping and delivery to the ice crusher, should not exceed $3 per ton of cider measuring about 230 gallons, provided ice making is carried on during the balance of the year, so that the yearly fixed charges of the ice factory are borne by cider and ice in proportion to the amounts frozen. In the second operation about one-third of the original volume of cider is refrozen, bringing the total cost of freezing up to $4 per ton, approximately, or 8.7 cents per gallon of concentrated cider. Where an ice plant is to be erected for the purpose of freezing cider alone, using it at full capacity for but a few months each year, the cost of freezing will necessarily be much higher.

LABOR COST.

Two men, with the assistance of the engineer at the ice plant, whose labor is included in the cost of freezing, can easily operate the centrifugal machine at the rate of 300 pounds of frozen cider per 10 minutes, amounting to a little more than 7 tons per 8-hour day. About one-third by volume of the original cider is returned for refreezing. On the following day the ice obtained on the day previous is recentrifugalized, requiring about a half day's work, and two days later the centrifugalizing in the second operation, requiring about a half day's work, is accomplished, producing cider concentrated by freezing in finished form, except for filtering, which may or may not be done, at the option of the manufacturer. Thus, approximately two days' work of two men is required in working up 7 tons, about 1,600 gallons, of fresh cider, or 320 gallons of cider concentrated by freezing. At $2.50 per day the labor charge is thus $10, or 3.12 cents per gallon. The power required for crusher and centrifugal machine and for small hoist for elevating the ice for recentrifugalizing totals less than 10 horsepower. The crusher requires 2 horsepower, centrifugal 5 horsepower, and hoist 2 horsepower. The centrifugal costs $560 complete and the ice crusher $84. These are the prices paid by the department on competitive bids for a 30-inch centrifugal and a

standard crusher for 300-pound blocks of ice. Erection of the equipment and necessary pumps and vats for economically carrying out the process should bring the equipment cost to between $1,000 and $1,500, not including the cost of the building. A plate-and-frame filter press and feed pump costs about $300. It is worth while calling attention to the fact that centrifugal and ice crusher, as well as hoist, filter press, and feed pump, are made to stand heavy, constant service.

We thus have the following estimate of cost per gallon for the preparation of cider concentrated by freezing:

	Cents.
Raw material	30
Freezing	8.7
Labor	3.12
	41.82
Filtering, power, interest, depreciation, superintendence, and other charges	8.18
Total	50.00

The cost items classed under filtering, power, interest, etc., can not be determined at the present time with anything like accuracy. They will necessarily vary with the volume of cider concentrated. On the whole, however, a cost figure of 50 cents per gallon is a conservative estimate for the preparation of cider concentrated by freezing, on the assumption that the brine tank of a going ice plant is available for the freezing.

The methods of making apple sirup and concentrated cider which have been discussed are offered as a possible means of saving an important waste in a food crop of the nation. What the commercial future of the two products will be remains to be determined under actual marketing conditions. The department has every confidence in the feasibility of making the two products where the apple supply and the manufacturing conditions are suitable. The development of this infant industry must now be left in the hands of the progressive American manufacturer. A process which will make pure, fresh cider available as a summer drink at our soda fountains should open up a new and valuable market for the juice of surplus apples. Whether young America will eat apple sirup on his bread and his mother use it in her kitchen must be decided by the American people.

THE ECONOMY OF FARM DRAINAGE.

By R. D. Marsden,

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INTRODUCTION.

ONE traveling thoughtfully through the agricultural districts of the States east and south of the Missouri River is impressed with the vast amount of farm land that is covered with rank growths of coarse grass, weeds, and brush on the borders of ponds and winding sloughs, and with the number of almost barren spots on cultivated hillsides, marking the location of soft, wet places. In dry years the cotton, corn, or small grain bordering these waste places will be most luxuriant, but in wet seasons the growth is apt to be thin and sickly. Much of the flat bottom land in the valleys of the smaller streams is given over to grazing or to indifferent hay crops. Not only are these wet lands unsightly and unprofitable, but as breeding places for mosquitoes and other insects they are responsible for considerable discomfort, as well as for the spread of malaria. Many a farmer gazes at these lowlands, obviously very fertile, wishing he could profit by their richness. Every farm worker knows the annoyance of plowing around instead of across the low spots, where the soil is sticky or gummy when a little wet and is baked hard when dry. A great difference in value between these ordinary farms and those which show an even growth of healthy plants from corner to corner of every field is universally recognized. (*Pls.* XVII and XVIII.)

PROGRESS IN DRAINAGE.

The area of farm land needing drainage is not accurately known, but it has been variously estimated that there are 100 to 150 millions of acres now classed as cultivated that could be drained with profit under present conditions of market facilities and cultural methods. This does not include 75 to 80 million acres of swamp and overflowed land and some millions of acres of tidal marsh that could be reclaimed with profit.

The lead in drainage has been assumed by the States of the upper Mississippi Valley, and many thousand miles of drains have changed a considerable part of the waste and less profitable lands into well-cultivated fields. This transformation continues at a rapid rate. The first tile drains in the United States were undoubtedly those installed by John Johnston on the border of Seneca Lake, N. Y., in 1835. Tile drainage is quite common in that State, but is not so generally practiced there as it is farther west. In many of the Southern States systematic farm drainage has been unknown until within a very few years. In this kind of farm improvement North Carolina seems to lead her sisters south of the Potomac River; but with perhaps 6,000,000 acres of land under cultivation needing such improvement, it is doubtful if she has thoroughly drained more than 6,000 of them. Alabama has 1,500,000 acres needing farm drainage, yet probably less than a thousand have been tiled. The lack of progress doubtless is due largely to a feeling of uncertainty among the landowners regarding the effectiveness of drainage, a lack of ready capital, ignorance of drainage principles and practice, and failure to view an expenditure for drainage in the light of a business investment. A great many farmers are trying to get as large an income as possible from their lands without putting in a sufficient amount of capital, because every expense appears to be merely a reduction of profits.

EFFECT OF DRAINING.

The effect of an excess of moisture is readily apparent in farming a wet area, although persons not acquainted with drainage do not always recognize the presence of too much water in soils that are not saturated. The low part of the field is not ready for plowing and planting as early in the spring as the higher parts, hence, unless the spot is to be abandoned, the farmer either must finish the task another day or leave the whole until such a time as the wet place can be worked. Planting on all or part of the field is then delayed frequently 7 to 10 days later than on land better drained. The wet ground is cold, too, and the seed in it sprouts more slowly, wherefore the advantage of the drained land is increased. The difference between the two parts or

he two fields continues to grow as the season advances, for the undrained land frequently can not be cultivated until several days after heavy rains, and again coldness retards crop growth, as in the spring. The difference in temperature may be 6 to 10 degrees between the drained and the undrained soil. The effect of later planting and slower growth must be apparent in the harvest, especially where the growing season is cut short by frost. On a field not uniformly well drained the crop will mature unevenly and not only will the yield be impaired in amount, but if uneven in quality the crop will be rated for market at a low value. The advantages of early planting and continuous cultivation are especially evident for those crops which command high prices when they reach an early market.

Farm drainage will not only dry and warm land that is wet and cold, but it has a marked effect upon the physical structure of the soil. Clays are usually very plastic and sticky when wet, very hard when dry, and permit the percolation of water very slowly if at all. After drainage the same soils become looser, forming into small grains or crumbs. The granular structure gives large pore spaces, through which the water passes downward by gravity more freely, and breaks the continuity of the tiny capillary tubes by which the moisture moves upward as evaporation dries the ground surface. Therefore the drained clay neither remains saturated so long nor dries out so thoroughly as before drainage, but retains a film of capillary water about each soil grain, while the gravitational water passes out and is replaced by air. This is the soil condition necessary for a healthy growth of the usual cultivated crops. The looser soil is much more easily worked, and through it the plant roots spread more freely to a larger supply of nourishment. The effect upon soils of a peaty nature, such as those formed largely from vegetation growing about the edges of ponds and lakes, has been to hasten decomposition of the organic matter and to make the land firm and fit for cultivation.

Drainage adds no plant food to the soil, except the nitrogen that certain plants gather from the air, which replaces the water drained away. But the presence of air and the higher temperature induce the growth of bacteria that release certain food elements from insoluble compounds and make

them available for the use of plants. In this way does drainage increase the fertility of soils. Moreover, a drained soil offers a deeper feeding ground for the plants. The roots of most cultivated crops will not go into a saturated soil, and will die if kept in water without air for more than a short time. The root zone is, then, not the depth above the plane of permanent saturation, but only that soil into which the fluctuating water table does not rise except for periods too short to injure the roots seriously. Drainage tends to increase this depth to that of the drains, and thus make a greater quantity of food available; hence an increase in the crop yield may ordinarily be expected from the drainage of much land already under profitable cultivation. Moreover, lowering the danger plane and reducing the fluctuation of the water table above the permanent elevation gives a greater storage space for the capillary water needed for plant growth and induces the roots to go nearer to the source of moisture in a dry season, thus giving a measure of insurance against drought. It is frequently noted that the growth upon drained land is better than upon undrained land in protracted periods of dry weatber

KINDS OF DRAINS.

Farm drains may be either open ditches, or tile, or a combination of the two. The "blind ditches" of stones or poles covered with earth have been practically abandoned because they are not permanent, usually becoming clogged with dirt in a very few years. Open ditches are usually less costly to construct, especially when large capacity is required, and water on the ground surface will flow into them more readily, but for the smaller drains tile has a number of advantages. Open ditches interfere with the cultivation of the fields, especially so where large machinery is used, but tile are buried deep enough to be out of the way of farming operations. The whole field may be cultivated when underdrains are used, whereas a system of ditches occupies an appreciable portion of the land area. The matter of maintenance is of prime importance in considering which kind of drains should be used. The banks of the ditches are often covered with a growth of weeds and grass which causes annoyance in cultivation and impairs the efficiency of the ditch. Teams

FIG. 1.—LAND NEEDING DRAINAGE, HENDERSON COUNTY, KY.

FIG. 2.—COWPEAS ON DRAINED LAND ON THE SAME FARM AS PICTURED ABOVE.

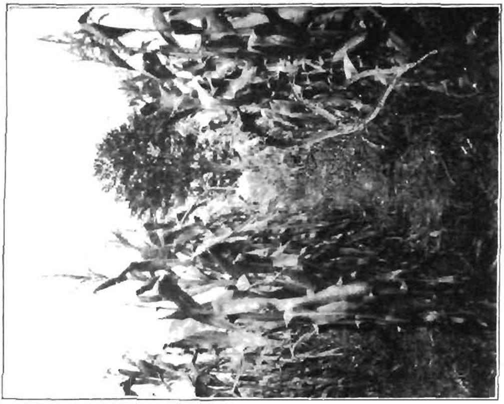


FIG. 2.—THE SAME LAND AFTER DRAINAGE (1914).

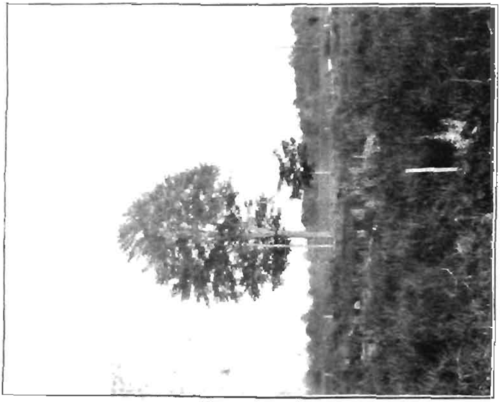


FIG. 1.—UNDRAINED LAND IN TALBOT COUNTY, MD. (1911).

FIG. 1.—UNDRAINED LAND, STATE TEST FARM, WILLARD, N. C. (AUGUST, 1910).
[Cowpeas after two plantings of corn the preceding spring.]

FIG. 2.—COWPEAS AND CORN ON THE SAME LAND AFTER TILE DRAINAGE. CORN IN PLACE OF TIMBER (AUGUST, 1913).

FIG. 1. TYPICAL CROP IN BLACK PRAIRIE BELT OF ALABAMA. UNDERDRAINAGE NEEDED.

FIG. 2.—TILE-DRAINED LAND IN BLACK PRAIRIE BELT OF ALABAMA, GROWING 26 BALES OF COTTON ON 20 ACRES WHICH BEFORE DRAINAGE YIELDED 2 TO 6 BALES.

used in cultivating frequently break down the ditch banks, causing obstruction to the waterway. No little time and labor are required for cleaning the ditches, which more often than not are neglected when attention is most needed. Well designed and constructed tile drains require no attention except occasional examinations to see that dirt or brush have not fallen in front of the outlet, and perhaps the removal of sediment from a few silt basins at infrequent intervals. When fertilizers are applied an appreciable amount may be washed off the field into the ditches; with tile drainage the movement of the water is downward through the soil and little if any fertilizer is lost. For some of the exceedingly dense alluvial soils of the lower Mississippi Valley it has been found expedient to place tile drains at a minimum depth and spacing, supplementing them with wide, shallow ditches that do not interfere with farm work or lessen the productive area, but which collect the surface water and remove the greater part of it. Means are easily provided for letting surface water directly into the tile without injury to the latter.

COSTS.

The cost of drainage will vary considerably with the location of the work, owing to differences in the cost of tile and of labor; it will vary more with the nature of the soil and the consequent depth and spacing of the drains. Tile of 4-inch inside diameter will cost $16 to $20 per thousand feet at the factory, and often $25 per thousand delivered at the railway station. If 4-inch tile cost $25 per thousand, 5-inch will cost about $35, 6-inch about $45, and 8-inch about $80 per thousand feet. Labor will vary from 75 cents to $1.50 or more per day, but as the cheaper labor is considerably less efficient the cost per rod of drain will be more uniform. As an average cost for trenching, laying, and backfilling over the tile, about 50 cents per rod for a depth of 3 feet may be assumed; lower prices may be secured on large contracts that make it economical to use a trenching machine or a large force of experienced workmen. Deeper digging and larger tile require more excavation and involve higher prices. There also will be expense for hauling the tile from the railroad, and for engineering work in planning and laying out the drains. Silt wells, surface inlets, and masonry protection for tile outlets must be provided where needed. The

total cost of drainage will ordinarily range from $15 to $45 per acre, the lower price mentioned being reached when the spacing of drains is perhaps 150 feet and the higher figure when the spacing is about 4 rods or a little less. A very common cost for tile drainage is $25 per acre. The farmer can often do a considerable part of the hauling and other labor with his own teams and regularly employed help, especially where the amount of work is not large, saving no small cash outlay. Of course the foregoing prices do not anticipate the excavation of rock, large stones, or other very hard formation in any considerable quantities, for this will quickly multiply the labor cost.

Open ditches cost from 12 to 20 cents per cubic yard of dirt removed, the price increasing with the size of the ditch because the material must be moved farther. A ditch 3 feet deep, 2 feet in top width, and 1 foot in bottom width would cost 33 cents per rod at 12 cents per cubic yard; a ditch 4 feet deep, with 3-foot bottom and 6-foot top, would cost $1.65 per rod at 15 cents per cubic yard; and a ditch 4 feet deep, with 4-foot bottom and 8-foot top, would cost $2.95 per rod at 20 cents per yard. If open ditches of the smallest size were used 150 feet apart, with a collecting ditch of the medium size, the cost of drainage would hardly be less than $7 per acre. The difference between tile and open drains would then be $8 per acre; the interest on such an investment would be 80 cents per acre at 10 per cent, or 50 cents per acre at 6 per cent. This amount would not nearly pay for the labor of keeping the ditches clear of weeds, dirt, and other obstructions, not to mention the increase in labor occasioned by having the field cut into small parts. The advantage of using tile becomes greater as the distance between drains is reduced, not only because of the labor of cultivation, but also because of the ground area used for ditches instead of for cropping.

PROFITS.

The actual value of farm drainage is indicated by the testimony of owners who have done this kind of work. Many of them state enthusiastically that drainage has doubled and trebled their crops and has increased the value of the land 50 to 300 per cent. The examples cited herein have been selected as typical of the results from properly draining farm lands in the humid region of the United States. Because

the reclamation of large swamp tracts frequently involves considerable expense for clearing and sometimes for soil treatment after drainage, the profits shown below are in no way indicative of those to be obtained from large swamp reclamations. Neither should these results be used in considering the drainage of irrigated land in the arid region.

In the coastal plain of North Carolina about 25 acres that were producing nothing were tile drained for perhaps $250, probably not including costs of teaming and of supervision, and since then have produced a bale of cotton per acre. (Pl. XIX.) A field of 6 acres was drained for about $160, and the owner makes good crops on soil worthless without drainage. In the black prairie belt of Alabama, a field that had not been cultivated in years because too wet was drained with tile; then it produced one bale of cotton per acre and repaid the entire cost of drainage the first year. (Pl. XX.) The following year the field yielded 50 bushels of corn per acre, twice the rate from the other parts of the farm. Another drained field produced one bale of cotton per acre, while the undrained land produced only half a bale. A 10-acre field that yielded practically nothing in 1912 was tile drained, and in 1913 produced 60 bushels of oats per acre; in 1914 the rate was again 60 bushels of oats, in contrast to 10 bushels per acre from the adjoining 15-acre field planted to the same grain. The cost of most of the tile drainage in Alabama has been about $25 per acre, some of it as high as $30 to $35, but increases of 50 to 200 per cent in yields and the assurance of good crops every year instead of only in very favorable seasons are very satisfactory returns. The cost of drainage there has usually been repaid in two to three years by the improved crops. In Iowa, a field of 40 acres too wet for planting was tile drained at a cost of $24 per acre, after which it produced 60 bushels of corn per acre. Another field was drained for $23 per acre, thereby increasing the yield from 15 bushels to 40 and 50 bushels of corn per acre. In Arkansas, on one of the State farms, 1 bale of cotton per acre was secured in favorable years, and nothing at all when the early part of the season was wet; the year following the installation of tile the yield was 1½ bales per acre. In Nebraska a tract of more than 700 acres was tile drained at $24.25 per acre, a pumping plant cost $2 per acre, and as part of a larger district the cost of levees to protect from overflow was $9 per acre. The

improvement, for a total cost of $35 per acre, immediately increased the crop on about 80 acres of corn 22 bushels per acre, and on another part the increase in two years was from nothing to more than 30 bushels of wheat per acre.

Owners have found that tile drainage has reduced the cost of farming operations 20 to 50 per cent, so the increased production on land cultivated previous to drainage is clear profit. To find the profit upon draining land that has been abandoned, of course the cost of planting, cultivating, and harvesting must be deducted from the gross receipts for the crops raised. Investigations of the cost of producing cotton and of producing wheat indicate that where expensive fertilizers are not used the cost per acre for growing and marketing varies little if at all with the rate of yield.

To compute the actual money value of drainage requires that certain assumptions be made. If the average production of a field is increased about one-half bale of cotton per acre, worth 10 cents per pound, the income is increased about $25 per acre, equivalent to a 10 per cent dividend on $250, or a return of 71 per cent on a drainage cost of $35 per acre. If drainage increases the yield of corn 25 bushels per acre, worth 50 cents per bushel, the returns of $12.50 per acre would be equivalent to a 10 per cent dividend on $125, or 50 per cent annually on a cost of $25 per acre. However, to capitalize the net increase in value of the crops at the regular rate of interest might be a fair measure of the increase in producing value of the land, but this is the result of drainage added to what may be called the unused fertility of the soil. It will be better to consider the increase brought about by drainage in the market value of the property. In the Piedmont section of North Carolina a 55-acre farm was bought about six years ago for $1,900; ditching was started the first year and tile drainage two years later; in 1913 the crops were worth $2,000, and in 1914 the owner refused $5,000 for the farm. In the mountain section of the same State about 22 acres that grew only saw grass and bulrushes were tiled for $35 to $40 per acre, and the owner now values the land at $150 per acre. Another farmer spent about $200 cash, and probably some of his own time, in tile drainage, and thereby increased the market value of his farm $500 to $800. Another man reports the results as 300 per cent increase in the selling price of the land and 40 per cent in the assessed value; still

another, who drained 10 acres for about $140, gives the results as one-third increase in assessed value, two-thirds increase in selling price, and more than 100 per cent increase in production. In eastern Maryland tile work costing $500 increased the farm value $1,000, and work costing about $240 increased the value of another farm $500.

In considering the economy of farm drainage it is proper to compare the anticipated results with the probable returns from otherwise investing the money that the drainage work will cost. When a farmer considers investing some of his savings to increase his business a question often to be met is: Shall he buy more land or improve some of what he already owns? If corn land producing 50 bushels per acre sells for $80 per acre, and he has marsh land which cost $10 per acre that produces nothing, drainage at $30 per acre will be profitable if it will make the marsh produce 25 bushels of corn, provided there are no other costs for preparing the land for cultivation. If the whole cost of drainage and other reclamation work is $50 per acre, and the result 50 bushels, the land has been made worth $80 for a total cost of $60 per acre. If land yielding 40 bushels per acre can be made to produce 50 bushels by drainage at $25 per acre, perhaps it would be true economy to buy more good land at the price stated rather than to drain; for $1,000 spent improving 40 acres would yield 400 bushels, while the same money buying 12½ acres new would yield 625 bushels. The difference in value at 50 cents per bushel would be $112.50. However, the increase in cost of farming the larger acreage might be considerable; if it would amount to as much as $3 per acre it would more than offset the difference in total yield, for there would be no increase in cost of farming on the drained land. Actual comparisons of the profits to be obtained from farm improvement and from purchasing improved land will many times show the farmer to be true economy, in spite of seemingly small gross returns. As larger markets raise the prices of agricultural products, land values must increase and larger expenditures per acre for drainage will be profitable.

PROPER PLANNING ESSENTIAL.

A careful business man in making investments considers security first and dividends afterwards; it is the gambler that takes chances, risking much in play for high stakes. The

man of small capital least of all can afford to expend money without certainty of the returns, yet it is he who most often economizes by undertaking drainage work without expert assistance. The wonder is not that a considerable amount of money spent for drainage has been lost, but that so much of it has been profitable. To determine the most economical plan of drainage usually requires engineering judgment of no mean order and a thorough knowledge of the drainage properties of soils. One not experienced in this kind of work should not take the responsibility of planning any considerable expenditure for drainage. There are many farm owners that realize the need of drainage, but have not the means to do a great deal of work at a time, and therefore are loth to pay for the services of a drainage engineer to determine what work is needed and to plan it so that it not only will cost least in the end but also can be constructed in an orderly and economical manner.

Before other expenditures are made there should be a careful survey and examination to determine the source of the water to be removed and its amount, the most economical arrangement of the drains, the grades obtainable and the proper sizes of drains, and the amounts of tile and of labor. The cost of drainage can then be estimated quite closely by one acquainted with work of this kind. Sometimes only a few drains are needed in the lowest parts of the field; sometimes a uniform system is required with parallel lines underlying the whole area. In the latter case experienced judgment is needed to decide what will be the proper depth and spacing for each kind of soil. Drains 100 feet apart when they should be only 75 feet will not give good drainage; drains 4 feet deep may be almost an utter failure where 3-foot depths would be markedly successful; if spaced 60 feet when 80 feet is sufficient the cost may be 20 per cent more than necessary; and drains 2½ feet deep may require a fourth more tile than if 3½ feet deep without having so great an influence upon the yield. Of prime importance is the outlet, which not only must be the lowest point of the drainage system, but it must be so located and arranged that it will discharge the water at the time when drainage is needed and not be useless because of high water in the outlet ditch or creek. These conditions may require that the outlet drain be carried some distance beyond the edge of the field or the

farm to be benefited and may add appreciably to the cost, but the work must be foreseen and the expense counted in considering the advisability of drainage.

Construction work should be carefully done, under the supervision of some one at least qualified to see that the tile are laid according to the grades established by the engineer who planned the work. The tile must be laid to true grade and alignment, for very slight irregularities will retard the flow and permit dirt to fall into the drain. Many a drain has been choked by sediment deposited very gradually in a slight sag which could hardly be detected by the unaided eye. The employment of a competent drainage engineer to plan the drainage system and to supervise construction in the end will be the most profitable part of the investment.

Of course no expenditure for drainage will be profitable on an infertile soil. No amount of drainage will supply potash, lime, or humus. The fertility of the soil should be assured before drainage is planned, and if any element of plant food is lacking, the cost of supplying it must be reckoned. The cost of any supplementary treatment must be added to that of drainage in computing the total investment required. In finding the profits upon the investment it is necessary to deduct the cost of fertilizers and other expenses for producing and marketing from the gross receipts for the crops.

BORROWING CAPITAL FOR DRAINAGE.

A consideration of the figures given shows that often it would be very profitable to borrow money for draining farm land, and the question is not so often, Can the farmer afford to drain? but, Can he afford not to drain? If he can borrow money at 6 per cent, or even 10 per cent, and get 25 to 50 per cent per year, the loan can be paid back in a few years. It is the opinion of a member of the New York State College of Agriculture who has been giving a great deal of attention to tile drainage in New York that tile drains there ordinarily pay for themselves in two years.

Men with money to loan will not hesitate to lend for purposes of farm improvement when it is assured that the increase in commercial value of the property will be much greater than the amount of the loan, and that the increase of income will be sufficient to repay the loan and interest in two or three years. But one highly important factor in

assuring profitable returns upon any farm investment is the borrower's ability as a farmer. His land may be fertile or lacking only in some element that is cheaply supplied, its productiveness may be very greatly impaired by excess of moisture, and drainage may be obtainable at a comparatively low cost; yet men will not readily trust their money to a man who is lacking in industry, careless of machinery, stock, and other equipment, or wasteful of his income.

DRAINAGE THE CORRECTIVE OF ABNORMAL CONDITIONS.

The unparalleled prosperity of our country has made us wasteful as a people, and the abundance of fertile land that has been obtainable at little or no cost has had its influence upon our methods of agriculture. The supply of new land that does not require expensive methods of reclamation and farming now has been practically exhausted, but "we have not yet reached the intensive stage, where it will pay either the producer or the consumer to attempt maximum yields on American land." However, "it is relatively safe to invest capital freely upon the farm for the sake of correcting abnormal conditions and raising the yield to the normal."[1] Money expended for drainage is capital invested for correcting an abnormal condition, for eliminating waste in agricultural methods, and the profit to be obtained in doing this has been demonstrated by the results from work of this kind that has been done. Federal, State, local, and private institutions are teaching the economy of better farming methods, and drainage is receiving increasing attention from these sources. The progress that has been made in those localities where thorough farm drainage, especially tile drainage, was unknown three or four years ago is truly surprising. Large yields where small ones were previously obtained, at the same or frequently at less expense, and large profits from land that before was yielding nothing of value; these results upon a few farms in various communities are awakening landowners to undreamed-of possibilities in wet fields and waste areas. The rate of progress in drainage will rapidly increase as the real economy of this work is better understood, and the future is not far distant when the sloughs and marshes and spotted hillsides will be changed into fields both beautiful to see and profitable to cultivate.

[1] E. Davenport: Illinois Agr. Exp. Sta., Cir. 177.

MOVEMENT FROM CITY AND TOWN TO FARMS.

By GEORGE K. HOLMES, *Bureau of Crop Estimates.*

CURRENTS OF POPULATION TO THE FARM.

ANALYSIS OF THIS SOCIAL REDISTRIBUTION.

"BACK to the land" is a real movement to agriculture in this country, but it does not conform to the descriptions in newspapers and magazines. It is not a strong movement, it is not a concerted one, and it is not actuated by a single-minded purpose to promote agriculture for agriculture's sake. It is largely localized, it is a very composite movement, and it does not create in kind and characteristics the agriculture that is prevented by the migration from farms nor replace in kind and characteristics that migrated population.

One-third of the population having census occupations is agricultural, and the fraction has declined from 83 per cent in 1820 to 44 per cent in 1880, 39 per cent in 1890, 35 per cent in 1900, and 32.4 per cent in 1910, the figures for 1880 to 1910 being based on the census classification of 1900. These figures do not mean that this element of the population has absolutely declined. On the contrary, it was never so large in numbers as it is to-day, with probably more than 30,000,000 men, women, and children in the total of those with agricultural occupations and of their dependents.

The urban element of the population has been built up not only by immigrants but by transfers from farms to industry, trade, transportation, professional life, and other classes of occupation, as well as by excess of birth rate over death rate.

The stream from the farm, however, has been passed by a countercurrent of much smaller proportions and of a different character, to analyze which was the purpose of a recent investigation. Information has been derived from many thousands of crop correspondents, representing every agricultural neighborhood in the United States and covering a

movement from city and town to the farm that has taken place during the last dozen years.

A questionnaire was sent to about 45,000 crop correspondents. They were requested to report to what extent, in the region for which they were to answer, there had been a movement of population from cities and towns to the country for the purpose of engaging in agriculture either as the chief or as a secondary object of country life. For guidance in adopting uniformity of analysis by correspondents, it was suggested that the movement to farm ownership be divided into three distinctive elements, namely, to buy farms, primarily to live on them and to engage in farming operations; primarily for country homes during a part of the year, farming operations being of secondary account; and to buy farms for country homes and farming operations while continuing occupations in the near-by city or town. To the analysis of the ownership movement were added the tenancy and the labor movements. In addition to the suggested analysis, correspondents were requested to make their answers fit the facts of the local field in all other respects. The returns were made with evident intelligence and understanding of the subject.

GEOGRAPHY OF THE MOVEMENT.

This movement to the farm has existed in at least small proportions in all States—hardly perceptible in most of the Southern States, in the more exclusively agricultural ones in other sections, and in the sparsely inhabited ones, but most noticeable in New England, the Middle States, and the North Central States east of the Mississippi River, and quite generally as an accompaniment, if not a consequent, of near-by urban conditions.

FIVE MAIN CLASSES.

Five main classes appear in this movement: First, there is ownership of the farm, with residence thereon throughout the year, with exclusive devotion to agriculture, and this is the chief class.

Second, there is a small class, with ownership of the farm, residence throughout the year, some devotion to agriculture, and with continuance of former occupation in the near-by city or town.

Third, the farm is owned for seasonal residence, with some devotion to agriculture; this movement is small, but is steadily advancing and occupying a larger and larger part of the farming area.

The fourth class is a slight movement to hire farms, and the fifth is the movement of wage labor to farms almost entirely for temporary employment.

OWNERSHIP FOR RESIDENCE DURING THE WHOLE YEAR.

MANY SORTS OF PEOPLE WHO BECOME FARMERS.

City and town families that have acquired the ownership of farms, moved to them for permanent residence, and engaged in agriculture, thereby abandoning former occupations, have been numerous enough in many counties to attract attention. Among such families have been those of small tradesmen, who gave up a hopeless struggle in an overdone retail business and sought in the country a small farm where the cost of living was cheaper and where a more independent existence could be maintained. Merchants who have failed in business and have been unable to reestablish themselves have followed a similar course to escape the mischances of employment.

Mechanics have become small farmers, and so have common laborers, coal miners, steel-mill operatives, railroad employees, salesmen, and clerks. To this list may be added school teachers, sailors, oil-well employees, and sawmill men.

The object of these people has often been, not to follow the pursuit of agriculture in its all-around completeness, but to adopt it in small ways and in some of its features, as preferable to uncertain business and employment, with the expectation of finding a more independent living.

RETURNING TO FORMER LIFE.

Quite generally the men who have given up city and town occupations and become farm owners lived on a farm or in the country in boyhood; it has been infrequent that a perfectly raw city man has become a farmer.

Some of the men who have turned against the occupations of the city and town were farmers' sons who were lured from the farm by perhaps the false prospect of higher wages, and subsequently learned that the cost of living in the city

was higher than on the farm, and that the money rate of wages in the city was deceptive. Some of these young men have been satisfied to return to the farm after finding that they made no headway in the city.

Other farmers' sons who have gone to the city have undertaken to carry on a small business, perhaps with insufficient capital, and have failed, and some of these men have returned to agriculture.

In some small regions it was discovered that the return to the farm included in its movement "retired" farmers who had moved to the town with the expectation of spending the remainder of their days there, but had become homesick or had found town life to be short of expectations.

It has often happened that men who have passed middle age and have not advanced in city occupations as they hoped, found themselves with small means and with their economic prospect becoming more and more unpromising. These men have contributed considerably to the movement to agriculture—considerably in numbers, but not usually so in performance. While most of them have been farmers' sons or have lived in the country in boyhood, others have had little or no experience in agriculture or country life, and have had a hard struggle to establish themselves.

COLONIES OF VARIOUS SORTS.

Agricultural colonies, while not very numerous, have yet been noticeable. The most successful ones have been those that were established for the single purpose of getting a living. Italians have gone to Arkansas, for instance, and have engaged in fruit culture and other lines of agriculture; colonies of Poles have left Chicago to become farmers in Texas, and so on with people of other nationalities. These people, however, were an agricultural people in Europe, and have lived in the cities of this country only temporarily in order that they might accumulate savings sufficient to establish themselves as farmers.

Agricultural colonies of another sort have been established and maintained under the control of a competent outside management, as, for instance, the Jewish colonies in New Jersey, New York, and New England, and the Salvation Army colonies.

Agricultural colonies of still another sort have been those that were held together, sometimes poorly so, or briefly, by some bond of social or religious or economic theory. New colonies of this sort have been very few within the last dozen years.

PREFERENCE FOR COUNTRY LIFE.

It has by no means been true that the movement from city and town to the farm for permanent residence has included only those men who were more or less failures in their occupations, men who have not thriven to their satisfaction, and men who have desired to escape the uncertainties of employment for wages. This migration has included many men of means and agricultural intelligence, sometimes men who have accumulated a competence. These men have not been forced out to the farm by economic pressure, but they have followed lines of economic pleasure and preference for country life, and with some of them there has been a long-deferred realization of a dream of happy life in a farm home, often with surroundings of a beautiful nature.

ECONOMIC INDEPENDENCE.

The motives that have actuated this movement from city and town to the farm for permanent residence have been very numerous. Many of these have already incidentally been mentioned. Perhaps as prevalent a motive as any has been the belief that an economic independence of the family can be maintained by poultry raising or, at any rate, largely so. It was easy to demonstrate this with pencil and paper before establishing or acquiring a "poultry farm," as the advertisements called it. In the more promising plans for changing from city to farm life, provision has been made for truck crops, berries, and perhaps small fruits, with poultry as an adjunct.

The keeping of boarders from the city during the summer and early autumn has become such an extensive business that city families have acquired small farms for the purpose of combining agriculture with the keeping of boarders.

Other families have been forced to the farm to secure better health, and still others have joined the movement in

order that they might take their children from a bad environment in the city. Now and then a city family falls heir to a farm and takes possession of the inheritance.

HOMESTEADING.

During the period under review much homesteading has been done by city and town residents in extensive parts of the country where public land could be acquired. In movements of this sort city and town residents participated quite as generally as country people did, but many of them did so purely for speculative purposes.

Not all of those who acquired homesteads for permanent residence remained, for the reason that they did not have the stamina to stick, were unwilling to bear the privations, or had "bad luck," which may have meant almost anything.

ACQUISITION OF LAND BY THE LANDLESS.

This movement "back to the land" for permanent residence and exclusive devotion to agriculture has been mostly an economic one, but, with small exception, there has been no general consciousness of participation in such a movement. There has, however, been a conscious satisfaction in the acquisition of land by the landless. Farmers, who had previously been tenants in cities, have regarded the ownership of a farm, although a small one, and residence in the country, as important improvements in economic position.

GLAMOUR IMPARTED TO PROPOSITIONS.

In very recent years attempts have been made to throw a sort of glamour over poultry keeping and small farming propositions as affording independence to the salary earner who will move away from the city or town. The representations and encouragement given have met with much failure, and yet on the contrary with some successful response, especially from men who have held on to their salaries while testing the propositions.

INVESTMENT AND SPECULATION.

While the movement of city people to the farm for permanent residence has been perceptible during the last dozen years in the Northern States east of the Mississippi River

and in small spots elsewhere, there has been much buying of farms by city and town people for investment and speculation and not for their own residence.

There has been a belief by local investors and city people desiring to own, if not to live in, country homes, that the last chance had come to get a farm at any but an exorbitant price.

This movement to purchase for investment and for speculation has been more common in the South and in the North Central States than elsewhere. As one correspondent reports, "more townspeople have bought farms for speculation, or investment and income, while continuing to live in town, than to secure a home or change from city to country."

NONRESIDENT OWNERSHIP TO SECURE FOOD SUPPLIES.

Still another class of farm buyers who have continued to live in the city has been composed of men who operate their farms through a manager or let them to tenants, the principal motive being to have a near-by source of supply of milk, butter, vegetables, etc., and to have products of high quality.

The farm owners of this sort are well-to-do and wealthy. Their farms are a source of daily happiness to them and their families, and are places to which they drive with pleasure for inspection and direction.

This sort of farm owning is found perhaps more generally in the South than elsewhere. Merchants, lawyers, physicians, bankers, etc., buy farms near town, not to live on them, but to operate them with a manager, or tenant, and to drive out to them daily. These farms are looked upon partly as investments and partly as luxuries. In some cities it is quite the proper thing for a family of means to own a near-by farm as an adjunct to city life, and ride out to the farm daily and obtain from it a table supply of "fresh" things.

CAUSES OF FAILURE.

The movement from city and town to farms for permanent residence has not been uniformly successful; indeed the failures have been considerable. Success in agriculture requires a great variety of knowledge and much experience. A successful farmer of the present time may need considerable knowledge of chemistry, of bacteriology, of economic entomology, of the physiology and pathology of plants and

animals, of plant and animal breeding, of fungicides and insecticides, of the conservation of soil moisture, of botany, pomology, viticulture, of horticulture in general, and certainly much concerning the practical handling and marketing of his products.

Not only must the watchfulness of the farmer be unremitting, but his essential labor is exacting, often strenuous, daily and seasonally long sustained, requiring physical endurance as well as ready adaptability. The migrant from the city has not always known of these requirements, and is then poorly prepared to meet them.

Many city people who have gone to farms to live have failed because of inexperience and because of visionary projects. When they needed to depend on hired labor they have been unable to find laborers to employ or, if they found them, the laborers have been too untrustworthy and ignorant, and frequently the employers have lacked experience in their management.

Some of these farmers from the city have not been provided with sufficient capital, they have become discouraged because they have failed to get profit at once, they have had absurd expectations of profit, they have unexpectedly found a hard life, and some of them have been deceived by real estate agents into making unwise purchases of land that practically no one could have kept.

In the movement to new land many settlers were duped by real estate agents into buying land where farming operations were carried on against great obstacles and where failure was a natural result.

Overvaluation of land and excessive prices imposed upon it have often been a burden against which the purchaser from the city has struggled in vain. There are regions, large as well as small, throughout which agricultural land prices have risen above a fair economic level, and the situation has been disadvantageous to the new farmer with limited means. Either he has been cramped for capital or he has borrowed because of the exaggerated valuation, and he has had to work and strive, to this extent, against an artificial situation. For this reason many have failed to secure a footing as farmers, and also because of this condition many have been unable to make the venture.

LARGE PROPORTION OF SUCCESS.

On the contrary, a large proportion of the farmers from the city have successfully established themselves, although more generally in small ways than in large ones. Not all of them found poultry raising a losing venture, especially when combined with vegetables, berries, and small fruits.

In some cases, to bring in a money income, it was necessary that one member of the family should continue to work at his mechanical trade or in the mill while the other members of the family maintained the farm. Success in the farming venture depended largely on the knowledge previously acquired as well as on the experience that developed in the undertaking.

The farms acquired by city families for permanent residence have usually been small ones—from 5 to 10 acres and upward to 40 or 50 acres.

OWNERSHIP AND RESIDENCE, WITH URBAN OCCUPATION.

FARM LIFE GAINED.

In the movement from city and town to agriculture there has been a small amount of farm buying by men who continued their occupations in the city and town and who lived on the farm with their families when not following their occupations. This movement is found mostly east of the Mississippi River and in the Northern States.

Farms of this class have sometimes been large ones and the farming operations of considerable account, but in other cases the cultivated acres have been few in number and the products confined to vegetables, fruit, and poultry.

The men who have entered this movement have been engaged in business, or in the professions, and also they have been workingmen and laborers. Correspondents have specified merchants, bankers, physicians, manufacturers, clerks, salesmen, glassblowers, miners, mechanics, and so on.

PLEASURE AND ECONOMIC BETTERMENT.

Various motives have been back of this class of movement. In some cases the purpose has been to acquire a country home by families not owning, nor able to own, a home in the city. The workingman has desired to establish himself

on the land and has continued working at his trade in the near-by city while other members of his family have done the farm work.

The wealthy merchant has found pleasure in changing the place of his home from the city to a near-by farm, without giving up his occupation, and a similar conclusion applies to other business and professional men.

Some city families have moved out to a near-by farm, while the head of the family continued his occupation in the city, for the purpose of plainer and cheaper living; other families have made the change for reasons of health.

This movement to agriculture, therefore, presents evidence of both pleasure and economic betterment as underlying motives.

Some degree of failure has accompanied this movement. Sometimes the prices paid for the farms have been much too high and the mortgage has been too burdensome to carry. Often dependence on hired labor, its scarcity and incompetence, and the want of effective supervision, or of any supervision, have caused the failure of the undertaking.

FACILITIES FOR SUBURBAN TRAVEL.

The farms covered by this movement have necessarily been in the neighborhood of cities and towns. It has been made possible by the trolley road, the railroads, the commuters' trains, by the automobile, and by good country roads, but these facilities of travel make speculative land prices possible, and such prices count against a profitable agriculture.

OWNERSHIP FOR RESIDENCE DURING A SEASON.

ALTERNATE CITY OR COUNTRY HOME.

The city and town families that own farms for occupancy during the summer and perhaps a part of the autumn are a distinctive and somewhat uniform class. These families maintain at least two homes, one in the city or town, one on the farm, and perhaps another on the seashore, in the forest, or at some place in the country without attempt at agriculture. A large fraction of these farm occupiers are wealthy, and the remainder, as a rule, are at least well-to-do.

With most of them agriculture is a mere incident of their country life, not carried on for profit, but to assist in the maintenance of the establishment, or for pleasure.

There are some, however, who devote special attention to agriculture, and their farms are noted, at least locally, for the quality of products and the high character of equipment.

Within this class of farms are included some of those that are appended to the costly country "estates" of such places as Lenox and the southern Hudson River Valley.

HIGHLY LOCALIZED MOVEMENT.

This class of movement to agriculture is found mostly east of the Mississippi River, in a large degree in the North, and to some extent in some of the Southern States.

It is a localized movement and extends along the seashore and lake shore, into the forest, along the river, and among the mountains, or into any picturesque healthful rural region. It is most in evidence in New England, the Middle States, Virginia, Ohio, Michigan, and Wisconsin.

The motives that are back of the movement are largely the same as those that actuate the general movement to the country and to lakes and mountains in the summer by boarders and tourists—change of environment, recreation, pleasure. The city man who has a farm for a summer home takes his family there for pleasure, for promotion of health, and sometimes for social contact with families of the same sort. In some social circles it is good form to maintain a country "estate."

SOMETIMES WITH QUASI-ECONOMIC CHARACTER.

To some extent this movement has an economic character. A man who can afford to own two homes, one on a farm, may, if he pleases, find it cheaper to maintain his family on the farm during the growing season than to maintain it in town or at a hotel at some summer resort. Many of the abandoned farms in New England have been acquired by city men and have been converted by them into summer homes, with some attempt at agriculture.

The only part of this movement that has been distinctively economic has been the small migration of Northern

men to land owned by them in Florida for the purpose of raising early vegetables for the Northern markets, with return to the North at the end of the season.

EXOTIC FEATURES.

The results of this seasonal movement in many States are not entirely pleasing to the "native" farmers among whom it extends. The farms of wealthy people who use them for summer homes employ high-priced labor, some of it obtained locally and some brought from other places, and this gives an upward tendency to wages of farm labor around about.

Most of these summer "farmers" hold aloof from the local population. They do not support local interests, and contribute nothing to the permanent social, educational, and religious life of the people. They are often examples of extravagance and tend to create unrest among farmers' boys and girls, who begin to fear that labor is not respectable and who begin to dream of more costly styles of living.

The farms of these people who come from cities and towns to occupy them during a season are often highly capitalized, but not all of them are operated at a loss. As examples of agriculture they are not always suitable object lessons for the resident farmers, but sometimes they are. Some of these summer farms, on the contrary, are treated very poorly, are much neglected, and provide hardly more than pasturage and a garden. Some are small and have no manager, nor even a single laborer when not occupied by the owner's family.

THE OLD HOMESTEAD.

Some city and town men who buy farms are in a class in which the three classes already considered are merged. These are the men who were farmers' sons, left the farm to enter occupations other than agriculture, and in the prosperous years of later life buy "the old homestead" for sentimental reasons.

What they do with the farm depends upon circumstances; it may become a home throughout the year, or for a season of the year, or it may be placed in charge of a manager, or let to a cash or share tenant.

In any event, improvements more or less costly are made, and agricultural production is usually stimulated, but the farm is not always made financially self-sustaining.

FARM TENANTS.

LITTLE RECRUITING FROM URBAN LIFE.

Only to a very small extent do city and town families move into the country to become farm tenants. Farm owners are reluctant to let their farms to men without agricultural experience and without abilities above those of the mere laborer. It sometimes happens that a man who has worked as a tenant has moved to the city to get other employment and eventually returns to tenant farming.

During the last dozen years, among the city and town inhabitants who have returned to the farm to become tenants have been laborers, coal miners, cotton-mill hands in the South, and men in various lines of industrial employment. During the industrial depression of 1908 there was an increase in this movement back to tenant farming. Another cause of renewal of this sort of farming is the discovery that the cost of living in the city is higher than on the farm.

The families that have gone to tenant farms from city and town life have not always remained during the whole year, but, in some cases, they have returned to town after harvest. Some city families with small agricultural knowledge have been able to obtain tenancies on account of the scarcity of applicants with more experience, and others have joined the movement for the purpose of demonstrating whether they could succeed as owners, the ultimate object being to buy a farm.

This movement from city and town to farm tenancy is widely distributed throughout the country, yet it is so small that it is hardly discoverable even where most in evidence.

LABOR MOVEMENT.

SEASONAL MIGRATION.

Labor in great variety migrates seasonally from cities and towns to near-by farms and even to distant farms for short terms of employment.

The necessity for extra labor is felt mostly at the time of harvest. Among the crops harvested by this city labor, during the dozen years under review, have been wheat, corn, potatoes, hay, hops, and sugar beets. To these should be added, out of a long list, grapes, apples, oranges, peaches, and prunes. In Florida and California there is often pressing need for extra labor in harvesting fruits and vegetables.

Among the vegetables that have required city labor have been cucumbers, cantaloupes, pease, string beans, and tomatoes; and among the berries, strawberries, raspberries, and blackberries. Cranberry picking requires much extra labor and so does sugar-cane grinding and cotton picking.

Some of the negroes who have migrated from country to town go to cotton plantations at picking time, being carried out in the wagons of the planters and returned to the town at night.

Rarely is extra labor needed anywhere for planting or seeding, but it has been employed in some places in the cultivation of various crops and in chopping cotton. The need for this labor is specially felt in the care of crops that require hand weeding. Extra labor has sometimes been drawn from cities to cut corn and husk it, and for the purpose of thrashing grain and of baling hay and hauling it to the shipping station.

"A great deal of the work done on the farms of the United States," states Wallace's Farmer], "is done by migratory labor. Harvesters commence in Texas, and go up to Kansas and Nebraska, the Dakotas, and Minnesota. In olden times they passed their winters in the lumber camps, and in these days they 'hold up' in Chicago for the winter. In California tens of thousands of tent men move north with the season. There is more or less migratory labor in the corn belt, but its migratory character is not so pronounced as in the wheat harvest. We have farmers who hire help only for the summer and furnish no winter employment, and we have farmers who need help only in harvest."

CLASSES OF LABORERS.

The persons who leave city and town to work temporarily on farms are women and children as well as men. Women are mentioned as Italians and other foreign-born, and the

children are boys from orphanages, students, and high-school boys, as well as the children of the women who do this work and children of other working people. College boys have participated in this movement, and so have industrial workers out of employment or on a strike, soldiers' home inmates, and "tramps."

This sort of labor is in demand seasonally and wherever there is large or specialized production, and the movement is pretty well distributed throughout the whole country.

CHANGES OF ECONOMIC INDUCEMENTS.

To draw labor from the city to the farm it is necessary that wages should be high enough to attract the laborer. Labor drifts away from the farm to the city and sometimes returns as the economic situation changes. Perhaps an industrial depression will return some of this labor to the farm, or perhaps a shop or factory closes several weeks in the summer, during which time some of the employees work on neighboring farms rather than remain idle.

Hop picking, in great fields on the Pacific coast and in New York, has been sought partly as an occasion for a frolic as well as for wages, and the novelty of experience in farm labor has been an element in attracting labor from the city to the farm; but, notwithstanding, the labor movement under consideration is an economic one. It is also a movement that returns whence it came. The participants are largely persons who have engaged in this movement before, but from year to year there are recruits and deserters.

Relatively few persons coming out from the city and town, in this movement, remain on the farm, first as laborers and perhaps eventually to become tenants and owners. These permanent recruits to agriculture are too few to be regarded as a perceptible current of supply.

QUALITY OF MUCH OF THIS LABOR.

Much of the labor that goes from city to farm is "not worth much," or "not worth a rush," to use the expressions of correspondents. The man from the city often dislikes farm work; rural life is too tame for him; he misses the noise and excitement of the city.

City-bred men have little knack in handling farm animals and machinery and have to be taught to work on the farm. Much of the labor participating in this movement is low class in efficiency and is accepted by farmers as an alternative of losing some of their crops. In many communities laborers from the city will not work on farms unless a situation develops in which it is a question of labor or starvation, and even the imminence of this situation does not generally seem to compel the movement.

On the other hand, to avoid employing laborers from cities or perhaps in want of any hirable laborers at all, farmers in the same neighborhood cooperate to harvest and to thrash. By means of such cooperation and of an increased use of machinery the former demand for hired labor has been diminished outside of the cotton country.

CONCLUSION.

IN THE COUNTERCURRENTS THE FARM LOSES.

After the foregoing summary and analysis, it is plain that the movement "back to the land" very poorly offsets, to the extent of its meager proportions, the loss to agriculture of the farmers' sturdy sons who leave that occupation to enter industry, trade, the professions, and other occupations.

This movement from city and town to agriculture is highly varied, and covers a wide range of quality, quantity, and efficiency in the contributions. The principal class in the movement is composed of those who become farm owners for residence through the whole year, yet this is not a large movement. It is a phenomenon of the denser populations and is most in evidence in the North, east of the Mississippi River; indeed, it is almost entirely confined to this region.

It is also mostly an economic movement, in which are included the farm of the immigrant, who has remained in the city long enough to earn and save money for a first payment on a farm; the small holding of the city man who has failed, or done poorly, or is dissatisfied with working for wages, or who has become discouraged, after middle life, with the hopelessness of his city occupation; the farm of the mechanic, workingman, salesman, and other wage earners who seek a more independent livelihood; and the more pretentious farm

of the man who has come from the city well equipped with capital and knowledge.

The recruiting of agriculture from city and town receives little support from those few families that move out to farms while the head of the family continues his occupation in the city, traveling in and out morning and evening. But a practice in the South somewhat related to this, in which the family lives in the city or town and the farm is maintained as an adjunct to the city and town life, is of some account in promoting agriculture.

In the maintenance of summer homes on farms by city families there has long been a movement toward incidental agriculture, which has grown to very noticeable proportions in some regions. It is not mostly an economic movement, nor is agriculture its objective point, but in the aggregate considerable agriculture results. These people do not usually mix with the resident population nor participate in local affairs.

The movement of city and town families to farm tenancy is too small to be noticeable. The hired labor drawn to the farms from the cities and towns is considerably localized outside of the cotton belt and, where found, is often of large account to the farmers in time of harvest. This labor vanishes from the farm in a few days or weeks, or in the cotton belt at the end of cotton picking, some of it to return the next year.

From the farms there is a migration to cities and towns, and there are small return currents, but these return currents, to the extent of their size, do not make good the losses of the farm in the characteristics required for an effective agricultural population, with noticeable exceptions in the cases of some classes of those who move to the farm for permanent residence and exclusive devotion to agriculture, among whom are immigrants from foreign countries.

IS A BACK-TO-THE-LAND MOVEMENT NEEDED?

The agricultural population is a diminishing fraction of the total population in nearly all industrial countries for the reason that agricultural labor is made more and more efficient by the use of machines and by better agricultural processes. In the United States on the average in every three families one is devoted to agriculture. To what extent

a "back-to-the-land" movement is needed for economic reasons and to increase the food supply has been much discussed in these recent years of high food prices. The movement from the farms is popularly deplored and regarded as a national calamity, and the contrary aspect of the matter has hardly been noticed. This contrary aspect is presented by a recent writer.[1]

ASPECT OUTSIDE OF FIELD OF AGRICULTURE.

The movement back to the land, such as it is, has an aspect outside of the field of agriculture, as the foregoing analysis amply shows. This aspect is composed of the effects on the individuals who participate in the movement. These effects are economic and relate also to health, recreation, pleasure, and the elements of what we call "living," which are not exclusively economic. From these points of view alone encouragement of the movement can offer justification.

NATIONAL SELF-SUFFICIENCY.

On the other hand, from the point of view of National self-sufficiency in agricultural production, the fact still is that the National surplus of this production is enormous. In addition to cotton, which is half of the value of this surplus, the numerous products which are in excess of the requirements of National consumption contribute half a billion dollars annually to the value of exports, and grain and grain products and meat and meat products still present enormous totals and remain the second and third general classes of exports in order of value.

NATURE OF THE PRESENT AND FUTURE PROBLEM.

The problem of maintaining the National agricultural production at the least no lower than sufficient for a generous National consumption does not yet depend on the exodus to agriculture of a population of low efficiency from cities and towns for the reason that the Nation still possesses a large reserve in its present agricultural population. The real problem in its practical form is the holding of this reserve on the soil or, at the least, the prevention of its depletion below the point of National requirements.

OUR SHOREBIRDS AND THEIR FUTURE.

By Wells W. Cooke,
Assistant Biologist, Bureau of Biological Survey.

INTRODUCTION.

SHOREBIRDS[1] were found by the early settlers of this country in vast numbers on the coasts, the inland lakes, and even on the prairies, and while comparatively few now remain it was not until the early seventies that there was a marked lessening of their numbers. Since then shorebirds have been so persecuted that vigorous measures must be taken, and immediately, to save them. The principal causes contributing to their extermination are—the cultivation of the prairies of the Mississippi Valley, thus limiting the nesting and feeding grounds of the birds; the settling up of Argentina, their principal winter home, so that the birds are now under fire throughout the winter season; the decrease in number of ducks and geese, a circumstance which leads hunters to turn their attention to smaller game; the increase in the number of gunners, not only because of a larger population, but also because nowadays men and boys can easily obtain cheap modern guns; and the advent of the automobile, which takes hunters easily and quickly into remote places for week-end hunts. Under such conditions it is no wonder that shorebirds are being decimated and are rapidly disappearing from all their old haunts.

The problem of protecting our shorebirds is complicated by their extended migrations, which, part of the year, carry most of them outside the jurisdiction of the United States, for these birds are the champion long-distance migrants of the world. Few shorebirds put less than a thousand miles between their winter and summer homes, and most of them make a trip of several thousand miles each way. It is no exaggeration to say that most shorebirds nest close to the Arctic Circle and winter as near the Antarctic as they can find

[1] The term "shorebirds," as here used, includes the snipe, woodcock, curlew, avocet, plover, godwit, killdeer, and yellowlegs, as well as the host of sandpipers and the little "peeps" which swarm along the sea beaches.

land on which to search for food; the longest migration trip is that of the knot, which breeds on the edge of land nearest the North Pole and in winter seeks bleak Patagonia and even more distant Tierra del Fuego. A distance of 9,500 miles, from latitude 83° N. to latitude 55° S., separates the extremes of the knot's winter and summer habitats. Only one other bird in the world breaks this record—the Arctic tern. The tern does not nest any farther north than the knot, but since it gleans its food from the ocean it needs no land during the winter and spends that season along the edge of the Antarctic ice pack a thousand miles or more beyond the southern extremity of South America.

The two members of the shorebird group most important from the standpoint of the sportsman are the Wilson snipe and the woodcock. These two species are so retiring in their habits that they are seldom seen, except by those hunting especially for them, and their food is such that they are neutral in their relation to agriculture. Apparently they are serving their highest usefulness when they become the quest of the hunter, and for this purpose they have no superiors. Fortunately both these birds have comparatively short migration routes. The snipe breeds in Canada and winters in the United States (see map, fig. 16), while the woodcock scarcely passes our boundaries during any time of year, and its migration consists merely in withdrawing during the winter season into the southern part of its breeding range (see map, fig. 17).

THE WILSON SNIPE.

The Wilson snipe, often called the English snipe, and usually the bird referred to when snipe shooting is mentioned, is the principal game target among the shorebirds. It is found over nearly all of North America (see map, fig. 16), and being a dweller of thickets and marshes, where usually it can be shot only when on the wing, its pursuit appeals to the real sportsman; moreover, so sudden, rapid, and irregular is its flight that it taxes the highest skill of the marksman. Snipe shooting has the recognized merit that it furnishes the largest returns of legitimate outdoor sport for the smallest loss of game-bird life, and if such sport is to be possible hereafter three essentials must be realized: (1) an increase, if possible, but no decrease in the supply of birds;

(2) such an arrangement of open and closed seasons that whatever birds there are shall yield the greatest amount of sport for the number killed; and (3) (especially in the case

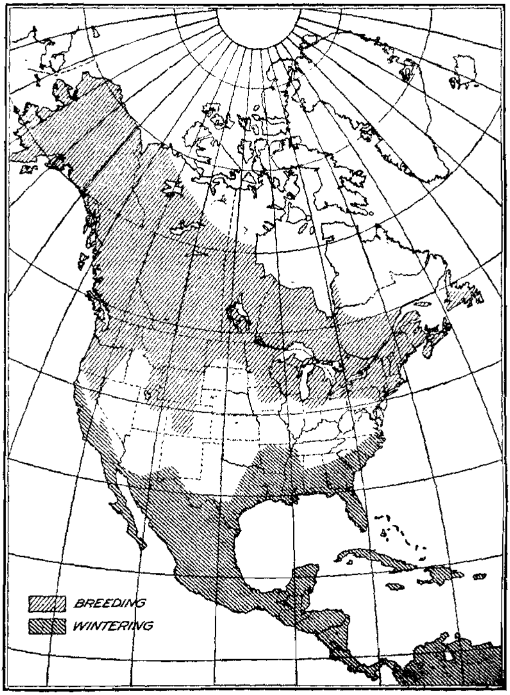


FIG. 16.—Distribution of the Wilson snipe (*Gallinago delicata*).

of the Wilson snipe) legal provision for distributing the number of snipe killed among the largest possible number of sportsmen.

All snipe hunters will agree that snipe have decreased decidedly in the past 25 years, and every student of the subject knows that this decrease is due principally to winter shooting in the southern part of the United States. The snipe nest principally in Canada, some even pushing north to the limit of tree growth almost to the Arctic Ocean, while a few nest in northern United States and south to the latitude of New York City (see map, fig. 16). They seem reluctant to return south in fall, even though they can have no appreciation of the constant persecution which awaits them during the six months' sojourn in their winter home. A few migrants appear in the northern part of the United States in early September, and, moving slowly southward, reach the southern part of the Gulf States shortly after the middle of October. Soon the main body of the birds follows, and all normally keep south of the line of frozen ground. Yet every winter some laggards remain much farther north, feeding about springs or streams. A few can usually be found on Cape Cod, Mass., while in the Rocky Mountains, near Sweetwater Lake, Colo., the presence of warm springs has enabled snipe to remain throughout an entire winter, though the air temperature fell to 30° F. below zero.

The number of weeks between the time migrants appear in the Northern States in sufficient numbers to afford fair shooting and that when most of the birds have been forced south by freezing weather marks the bounds set by nature to the length of the fall snipe-hunting season, usually from six to seven weeks in this section of the country. If all sportsmen are to have an even chance under the law, open seasons must be so regulated that the gunners in the middle and the southern parts of the country will be restricted to the same number of weeks. Unfortunately, under existing State laws the opposite condition prevails. Most of the Northern States do not open the snipe-shooting season until September 1—New York not until September 16—and there is not much good hunting after early November. On the other hand, when the birds reach the Gulf States in October they find the legal hunting season already open, and under the State laws they are subject to a continuous fusillade during the entire time of their residence in the South until

they depart the following spring for their northern breeding grounds.

Under this system the southern gunner has a shooting season about three times as long as that of his northern competitor and also a chance to bag even more than three times as many birds, because the Wilson snipe while in migration is erratic and likely to occur in numbers for only a few days in any one swamp or thicket, but after it reaches its winter home it congregates in certain favorite localities, where it is abundant every day throughout the entire winter. Winter shooting at these places in the Gulf and South Atlantic States is responsible for the heavy falling off in the numbers of the Wilson snipe. How they abounded formerly and how they were slaughtered by southern gunners is forcibly shown by the record of a single hunter in Louisiana, who, during the 20 years from 1867 to 1887, killed 69,087 birds, an average of 3,500 snipe a winter. In 1870 about 100 snipe were killed by this man for each day that he hunted. The maximum was reached in 1875, with 150 birds a day; this fell to 100 in 1880 and to 80 in 1887. Individual days far exceeded these average figures. The highest score for seven consecutive shooting days was reached in 1877, when, on December 8, 270 snipe were killed; December 10, 255; December 11, 366; December 13, 271; December 15, 286; December 17, 233; and December 19, 262—an average of 278 a day and a total of 1,943 birds in seven days of shooting. The bag on December 11—366 snipe—is supposed to be the world's record for slaughter by one man in one day.

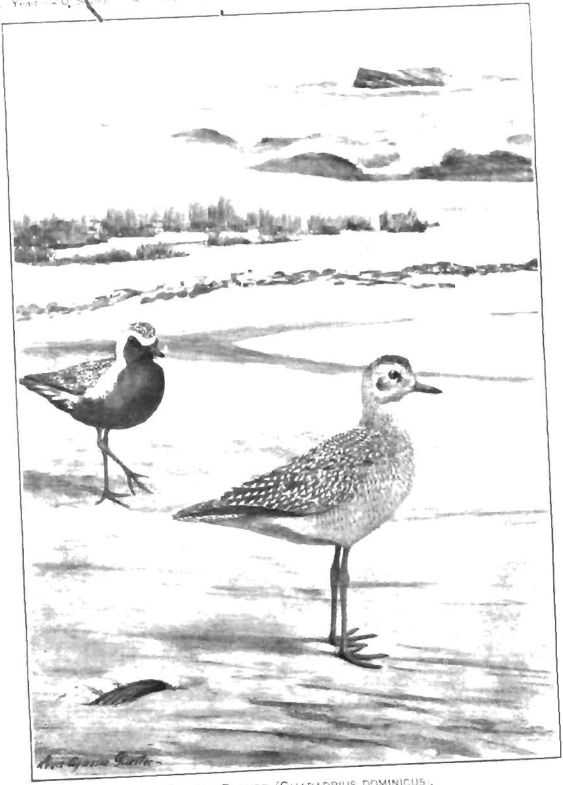
With such butchery in its winter home, it is no wonder that the numbers of the Wilson snipe have markedly decreased. Aside from other considerations, such wholesale destruction is contrary to sound business principles. Among the better class of sportsmen such a hunter is sometimes called a "game hog," whether he shoots for his own table and that of his friends, as was the case in the instance cited above, or whether he is a plain market hunter, who kills thousands of birds as a means of obtaining a livelihood. Had these 3,500 snipe been obtained in one season by a hundred different gunners in widely separated localities, instead of by one man in one place, their sport value to the community would have been increased many fold.

Fortunately the breeding grounds of most of the Wilson snipe are in Canada, where the birds are protected by both law and custom throughout the nesting season. Moreover, their nesting sites are on land that will not for many years, possibly not for several generations, be used for agricultural purposes. Hence there is provided in Canada an enormous and favorable breeding area for these game birds, a region which formerly supported a snipe population many times more numerous than at present and which will continue to return to us in the United States each fall a liberal increase on whatever numbers we may allow to cross our northern border in spring.

The snipe has suffered in numbers probably more severely from spring shooting than any other shorebird. In spring migration it is not confined to any special district, as the coast or large bodies of inland water or the plains, but it occurs over nearly every square mile of its range, and in the past has run the gantlet of gunners throughout the whole course of its northward flight. Snipe shooting is at its height early in March in the central part of the South and early in April in the region just south of the breeding range; but pursuit ceases and security comes at the northern boundary of the United States. Our Canadian cousins have set us a most praiseworthy example in absolutely abolishing spring shooting: once the snipe has escaped beyond the fire of Uncle Sam's gunners it is safe from human molestation throughout the nesting season and until it begins the fall migration. It is uneconomical, to say the least, to kill birds in March and April while on their way to the breeding grounds, for if left undisturbed they will certainly return six months later with 50 to 100 per cent increase in number.

THE WOODCOCK.

Of late years much interest has centered around the efforts of the friends of the woodcock to obtain better laws for its protection and to educate the public to understand what a crime against nature and sportsmanship has constantly been committed in the hunting of this, one of North America's finest game birds. The habits of the woodcock are such that if given reasonable protection it will thrive and continue to be common even in a thickly settled country.

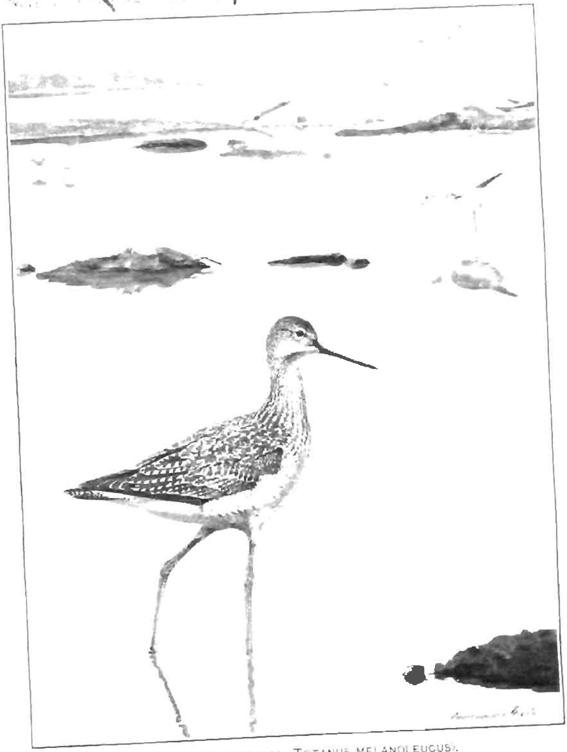


GOLDEN PLOVER (CHARADRIUS DOMINICUS).

[Lower figure, winter plumage; upper figure, summer plumage.]

PLATE XXII.

ESKIMO CURLEW (NUMENIUS BOREALIS).



GREATER YELLOWLEGS (TOTANUS MELANOLEUCUS).

It nests on waste ground unfit for agricultural purposes and requires, as an inducement to remain through the summer, only a few square rods of soft dirt which can easily be probed by its long, sharp bill. With a wide breeding range in the Eastern States and southern Canada, but almost entirely limited to the United States, its future rests almost altogether with the sportsmen of our own country.

Formerly the woodcock was abundant throughout this whole area of a million square miles, and large bags were expected each year by the army of sportsmen who looked forward to the woodcock season as the climax of the year. Now its thousands have become hundreds, and even the most ardent woodcock hunters are seriously considering the advisability of the prohibition of all woodcock shooting for a series of years until the bird shall have recuperated from its merciless persecution.

This near extinction has been brought about by three agencies—winter storms, spring shooting, and summer shooting. The woodcock winters in the Gulf States and as far north as it can find unfrozen ground (see map, fig. 17). Hence a very large percentage of the birds remain each winter in a zone of hazard, where at any time they are liable to be caught by an unusually severe freeze and brought to the verge of starvation. Scant mercy has been shown them by man at such times. For instance, one report states—

A cold wave, accompanied by a gale, struck the coast of South Carolina on the morning of December 27, 1892, * * * and thousands of woodcock were shot in the village of Mount Pleasant. They were everywhere—in the yards, stables, streets, and even piazzas. Everyone was out after the birds and everyone had a bag full to overflowing. On that day alone fully 2,000 were killed. On December 28 they were so abundant that every clump of bushes contained 10 to 15 birds. One man killed 58 without moving from his "stand" except to pick up the birds he killed. The flight lasted six days.

A still worse calamity overtook the woodcock on the coast of South Carolina in 1899, when, on February 14, the temperature dropped to 26° F. below freezing—almost zero weather. The woodcock arrived in countless thousands.

They were everywhere and were completely bewildered. Tens of thousands were killed by would-be sportsmen and thousands were frozen to death. The great majority were so emaciated that they were practically all feathers, and of course were unable to withstand the cold. One man killed 200 pairs in a few hours.

Even with the best of protection it would take many years for the woodcock of that district to recover from such catastrophe.

The woodcock not only winters as far north as it can, but is the earliest spring migrant of the whole shorebird group, arriving in the latitude of New York City by the middle of March and reaching southern Canada by the end of that

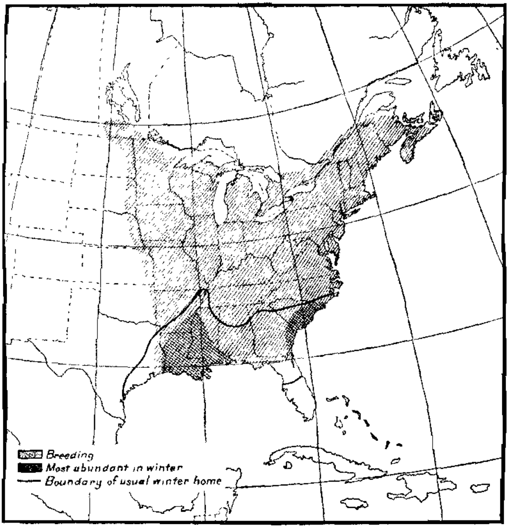


FIG. 17.—Distribution of the woodcock (*Philohela minor*).

month. This is, of course, before the leaves appear, and the ease with which the birds can then be seen makes this the favorite woodcock season of the pothunter. But in the whole year no season more destructive to the woodcock could be chosen. It migrates early because it wishes to nest early; indeed in Louisiana some of the birds are so anxious to start their housekeeping betimes that they lay their eggs in December. Throughout that part of the range north of

the winter home egg dates are so early as to make it certain that the birds are already mated when they arrive at the nesting grounds. Under such circumstances it is plain that spring shooting of woodcock is little less than barbarous.

But the pothunter is not willing to allow even the few young that may be raised a chance to grow to their full size and reach the condition in which they will afford real sport to a true sportsman. Hunters have been in the habit of beating the thicket for young birds only half to three-quarters grown; and the July massacre of these immature and easily taken fledglings was the final stroke in the series of disasters which has brought this fine game bird to the verge of extinction.

THE UPLAND PLOVER.

Another of our fine game birds is the upland plover. It also is one of those whose numbers have been dangerously depleted in late years and largely because of spring shooting. The main route of its spring migration touches the United States along the coasts of Louisiana and Texas, and from the middle of March, when the flocks appear in Louisiana, where they are known as "papabotte," until early May, when they pass beyond our borders into Canada, their ranks are constantly thinning under the fire of sportsmen and pothunters. In April, 1899, one man in southern Louisiana killed 117 in one day. Formerly more than half the upland plover nested within the boundaries of the United States, but now breeding birds are uncommon from Kansas to North Dakota, where originally they were most abundant.

Unfortunately, some of this loss is unavoidable, since the upland plover, as its name implies, is a bird of the open prairie, making its nest on the ground. In the Dakotas and Nebraska, where in the days of the cattle range the bird nested abundantly on the native sod and was almost undisturbed by the cowboys, thousands of square miles have been turned by the plow and now give support to a large population of grain raisers and dairymen. The same thing has happened and is happening in southern Manitoba and eastern Saskatchewan, where the birds—known locally as the "quaillie"—used to be even more abundant than in the neighboring parts of the United States.

However, the recent extension of the plover's range into northeastern United States partially offsets this and offers much encouragement for the future. To a bird of the open country the originally heavy forests of the Northeastern States offered scant inducements. With the clearing of the land the plover has gradually extended its range east and northeast until it has covered the open districts of this section of the country. Here its numbers have actually been increasing during the past few years, even with the scanty protection afforded by local game laws; and this may well serve to stimulate interest in the protection of the upland plover until this valuable game bird again becomes abundant.

The mountain plover—a misnomer, for it is rarely found in the mountains—is unknown to the sportsmen of the East, but on the plains at the foot of the Rocky Mountains it was formerly a common game bird. Indeed, in eastern Colorado 30 years ago so abundant was it and so highly esteemed for food that one man shot 126 birds in one day. Now it is rare, and needs full protection to prevent its absolute extermination.

OTHER SHOREBIRDS.

The same fate is impending over the avocet and the black-necked stilt. When the first explorers crossed the Rockies on their way to the Pacific they found these two species nesting abundantly around all the larger lakes and marshes and at almost every place where permanent water insured a rank growth of vegetation. But these well-watered spots were naturally those most often visited by the explorers and hunters. As a result the avocet and black-necked stilt, being not naturally shy, have been completely exterminated over most of their range and only a few small flocks remain in the wildest and least accessible districts to serve as a nucleus which, under adequate protection, might save them from utter extinction.

The long-billed curlew is no better off. The largest of the shorebirds, it has been pursued because of its food value as well as for the sport it afforded. Its solitary habit has prevented large numbers being killed at one time, and its wariness has made the gunner earn whatever he obtained; nevertheless its summer home, where it was originally found in largest numbers—the northern plains region—has

of late years become so thickly settled that the curlew has been forced out. Indeed, it has been practically exterminated on the south Atlantic coast, where it was formerly an abundant migrant, and it is one of the shorebirds likely to become extinct unless carefully protected.

The case of the willet is almost as deplorable, for its breeding range, which on the Atlantic coast once stretched from Florida to Nova Scotia, has become restricted to a few small colonies on the south Atlantic, while it has ceased to exist over most of the northern half of the plains, where it was once a common and conspicuous bird.

The godwit is another of the shorebirds that formerly nested in the prairie region of middle United States; now it breeds over less than a quarter of its former summer home and has ceased to appear on the Atlantic coast north of Florida, where it was once among the not uncommon migrants.

There are several species of shorebirds whose connection with North America is so casual that they would hardly increase, even if the best of protection were given them both in the United States and Canada. The sharp-tailed sandpiper breeds on the northern coast of Siberia, and in fall crosses to Alaska, thence back again to Asia, and by way of Japan and China reaches its winter home in Australia. Thus it breeds and winters in the Eastern Hemisphere and appears in the Western Hemisphere for only a few days during migration. The Pacific godwit breeds in Alaska, and of course can be protected during the few weeks of its nesting season there; but then it deserts the Western Hemisphere and winters in Australia, using the chain of the Aleutian and Commander Islands *en route*. The ringed plovers, which breed on Ellesmere Land and in Greenland, cross to the Eastern Hemisphere and make a European tour on their way to Africa for the winter. The turnstone uses both the godwit and plover routes, the individuals which breed in Ellesmere Land wintering in Africa and those which breed in Alaska wintering in Asia and Oceania.

Most shorebirds in their long migration journeys leave the protection of the United States either in summer or winter; but there is one group in the Pacific that has a wonderful migration route, and yet does not pass beyond our jurisdiction. Some golden plovers (Pl. XXI) breed in Alaska and winter

in Hawaii, and thus can be affected throughout the year by United States legislation. Many turnstones, sanderlings, bristle-thighed curlews, and wandering tattlers have the same distribution, and all of them make the journey from Alaska to Hawaii—2,000 miles—at a single flight, probably the longest single flight made by any birds in the world. It seems incredible that any bird can be capable of such a feat, yet thousands make this trip back and forth every spring and fall; and there can not be the slightest break in the flight, because between Alaska and Hawaii there is not so much as a single square foot of solid substance on which the birds can fold their wings and alight. How long a time is occupied in such trips is not now known, and may never be learned. Most migratory birds, in crossing large areas of water, start soon after sundown and reach their destination before morning. But the Pacific golden plover flies the whole day as well as the whole night, and as it probably does not exceed a speed of 50 miles an hour, the single flight from Alaska to Hawaii consumes nearly twice 24 hours. How superior the bird's mechanism to the best aeroplane yet made! These feathered aeronauts remain in the air several times as long as the longest endurance test of the most modern aeroplane, and there is much the same difference in the efficiency of the two machines. The to and fro motion of the bird's wing would seem to be an uneconomical way of applying power, since all the force required to bring the wing forward to begin the stroke is more than wasted, because it increases the air friction and retards the speed. On the other hand, the screw propeller of the aeroplane has no lost motion. Yet less than 2 ounces of fuel in the form of body fat suffice to carry the bird at high speed over that 2,000-mile course. To be equally economical a 1,000-pound aeroplane would have to use only a single pint of gasoline in flying 20 miles instead of the gallon now used by the latest models.

THE ESKIMO CURLEW.

One of the most striking examples of the havoc wrought by man in the ranks of shorebirds is afforded by the Eskimo curlew (Pl. XXII). When Audubon visited the Labrador coast in 1833, he said of their numbers: "The accounts given of these birds border on the miraculous," and later, when he saw them for

himself, he reports that they "arrived in such dense flocks as to remind me of the passenger pigeons." In 1860 Dr. Coues notes that the Eskimo curlew "arrived on the Labrador coast from its more northern breeding grounds in immense numbers, flying very swiftly in flocks of great extent," the flocks containing "many thousands." Even as late as the spring of 1884 the writer saw curlews by thousands going north across the Oklahoma prairies. To one seeing those apparently endless lines of birds flying swiftly by, day after day, it would have seemed as impossible that this curlew could ever be exterminated as it did to the early settlers that the passenger pigeon should become a bird of the past.

To understand how the great reduction of their numbers was brought about so speedily one must understand the summer and winter distribution of the Eskimo curlew and its routes of migration.

The enormous ellipse of the Eskimo curlew route—6,000 miles in its longer and 2,000 miles in its shorter axis—is adopted by several other species of shorebirds, among which are the dowitcher, stilt, white-rumped and semipalmated sandpipers, lesser yellow legs, and golden plover. Various theories have been advanced to account for this eccentric course. The simplest explanation seems to be that which may be laid down as the fundamental law underlying the choice of all migration routes. Birds lay out that course between the winter and summer homes which is the shortest and at the same time furnishes them most plentiful and attractive food supplies. The seven birds named are birds of treeless regions; they summer on the tundras and winter on the pampas. An unlimited food supply, especially palatable, attracts them in fall to Labrador, whence they take the most direct route to South America. To attempt to return by the same course in spring would be suicidal, for Labrador awakens slowly from its winter sleep and at the time of spring migration is still covered with ice and snow.

The principal breeding range was on the Barren Grounds near the Arctic coast in the northern part of the Canadian Province of Mackenzie (see map, fig. 18); the birds wintered for the most part in the campos region of southern Argentina and northern Patagonia. As soon as the fledglings were large enough to care for themselves, old and young hastened to

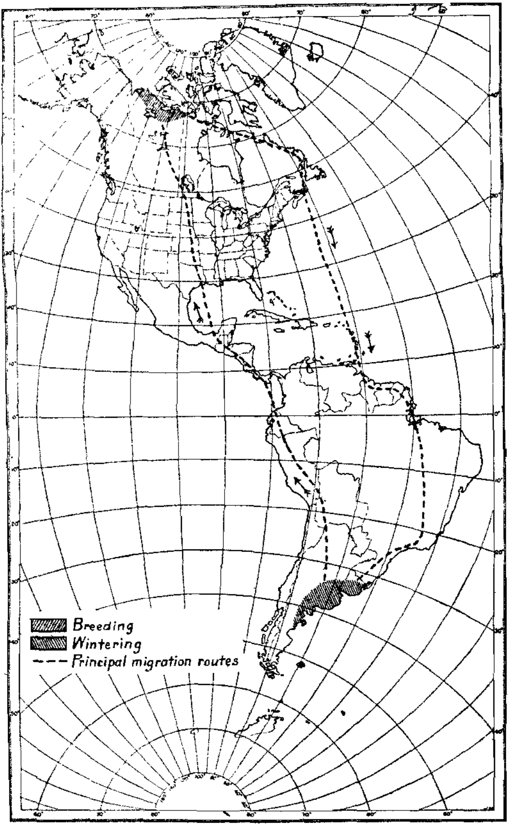


FIG. 18.—Distribution and migration of the Eskimo curlew (*Numenius borealis*).

the coast of Labrador to feast on the so-called "curlew berries." After a few weeks of gorging they flew across the Gulf of St. Lawrence to Nova Scotia and thence launched out over the ocean for a 2,400-mile flight. Reaching South America they crossed the eastern part of Brazil to their winter resort in Patagonia. In spring the whole course of their fall migration was abandoned and the curlews made their way north by a route some thousands of miles farther west over the prairies of the Mississippi Valley. Here the bird was abundant and well known. It arrived in Texas in early March and journeyed at a leisurely pace toward the breeding grounds, being common in April from Kansas to South Dakota.

These enormous flocks now exist only in memory; scarcely a dozen individual birds have been seen in the last dozen years. The cause of their disappearance is not far to seek. The Eskimo curlew was undisturbed by human foes during the whole of its summer sojourn in the Arctic, and only a small percentage were shot on the Labrador coast; but after arriving in Argentina in the middle of September, for a five months' stay, the birds scattered over the pampas and were continually a mark for hungry sportsmen. Later, from early March to early May, the flocks were beset by gunners on the Texas and Kansas prairies. As long as the Argentina campos and the United States prairies were the home of the cattleman, the Eskimo curlew lessened in numbers only gradually; but lately, especially since 1880, with its winter home in Argentina changed to a great wheat field, and its favorite prairie sod in our West converted into thickly populated farm lands, no chance for life has been left to the curlew. Of all the birds which adopt this migration route, the Eskimo curlew suffered most from man's onslaught, probably because of its habit of congregating in close flocks instead of the loose, straggling parties of its migration companions. Audubon noticed this peculiarity on the Labrador coast and says that when the birds were feeding on the ground they kept so close together that half a dozen could be killed at a single shot, and that when they started in flight the whole flock gathered in a bunch, thus giving still further opportunity for wholesale slaughter.

THE SMALLER SHOREBIRDS.

The smaller shorebirds, or sandpipers or "peeps," as they are commonly called, which are not large enough to be considered legitimate game birds, number about 30 species, or about half of all the species of the shorebird group in North America. Along the eastern United States coast are hundreds of miles of shore exactly suited to their needs, and until about 1870 these places swarmed with countless thousands of the dainty creatures, which made a charming and ever-shifting panorama as they moved from one feeding place to another, thus adding an attractive touch of life to the wind-swept beaches. Then, as the great flocks of ducks and geese shrank under the attacks of the market hunter until they ceased to supply the ever-increasing demand for game, the market hunters turned to the tiny shorebirds. These unsuspicious victims, bunching so closely that dozens of the mites could be killed at a single discharge, were shipped to market by the wagonload to furnish a scant mouthful of meat apiece as the only return for the destruction of one of nature's most beautiful creations. The assaults of the market hunter were supplemented by the incessant attacks of the boy, who, with the modern small-bore high-power gun, views anything alive as a fair target, and of late years he has swarmed in summer on the beaches from Virginia to Maine.

A peculiarity in the migration of the smaller shorebirds increases opportunities for their destruction. Many remain nearly all summer along the coasts of the United States, with only a few days between the disappearance in June of the last northbound migrants and the reappearance in early July of the vanguard of the fall migration. Thus in the case of the greater yellowlegs (Plate XXIII), the last leave Long Island going north the last week in May and return on their southward journey the middle of July; while in the case of the knot, the breeding area lies north of the Arctic Circle and the earliest spring migrants do not arrive there until about the first of June, yet fall migrants enter the United States early in July at just about the time the first eggs are hatching in the Arctic nests. It is certain that these very early fall migrants can not have raised families that season. It is not known whether these are birds which for one reason or another never bred

after they reached the northland and started at once on the return journey, or whether they are disappointed pairs whose eggs have been destroyed, and which, instead of attempting a second nesting, as is common among birds in temperate climates, began forthwith their southern flight, knowing instinctively that if a second set of eggs should hatch, the young birds would surely perish in early autumnal storms. Be that as it may, shorebirds become numerous on the beaches soon after the first of July, and during August, the month of the greatest outpouring of city dwellers to the seashore, many species reach their full fall numbers and consequently are subject to the greatest harassment as they flee from beach to beach vainly seeking a place of refuge.

PROTECTIVE MEASURES.

So much for the former abundance of the shorebirds and their present-day diminished and still diminishing numbers. What has been done to check the approach of extinction and what prospect does the future hold for ultimate success in shorebird preservation? Several years ago it became evident to advocates of bird protection that reliance could not be placed solely on State laws and local regulations. Though these were steadily being improved and an awakened public conscience was bringing about better law enforcement, yet it was only too plain that laws were nowhere sufficiently stringent, and that by the time they had improved enough to afford real protection no shorebirds would be left to be protected.

The only alternative, therefore, was recourse to Federal legislation; and after many years of agitation a National law for protecting migratory game and insectivorous birds was passed by Congress in 1913. Under its provisions the Department of Agriculture is given full authority to determine what shall be the closed seasons, and to prepare regulations for their observance. The committee in the department which has the matter in charge has been glad to accede to a widespread request from bird lovers that the small sandpipers be withdrawn from the list of game birds and be given protection throughout the year. To this list has been added the curlew, avocet, godwit, and some of the plovers, which have already been reduced to a small fraction of their

former numbers, and are rapidly nearing extinction. Since it was evident that protection in addition to that provided by existing State laws must be given also to the remainder of the shorebirds, it was beyond question that the best way to afford part of this needed extra protection was to prohibit all spring shooting. Within a few years a great revolution has taken place in public sentiment regarding spring shooting. Even ignoring the barbarity of shooting a mated bird, the conviction has become general that a given bird population will furnish the best sport and the greatest amount of that sport if shooting occurs only during fall migration, when the birds are at their best. Indeed, this belief has become so general that in all the speeches and discussions before both committee and Congress in regard to a National migratory game-bird law it was taken for granted that one of the Federal regulations would be the absolute abolition of all spring shooting. So complete had been this understanding that the framers of the regulations felt as much bound to include in them the prohibition of spring shooting as though it had been specifically mentioned in the act of Congress.

But as the shorebirds needed more than merely to be allowed a peaceable journey from their winter homes to the breeding grounds, summer shooting also has been prohibited and the opening of the hunting season has been placed late enough in fall to make it certain that even the latest hatched birds shall be full-grown and strong of wing before they become the gunner's mark.

To accomplish this the following regulations have been adopted by the Department of Agriculture, approved by the President, and now have the force of law:

Shorebirds.—The closed season on black-breasted and golden plover, jacksnipe or Wilson snipe, and greater and lesser yellowlegs shall be between December 16 and September 1 next following, except as follows:

Exceptions: In Maine, Massachusetts, New Hampshire, Rhode Island, and on Long Island the closed season shall be between December 1 and August 15;

In New York, except Long Island, the closed season shall be between December 1 and September 16;

In Minnesota, North Dakota, South Dakota, and Wisconsin the closed season shall be between December 1 and September 7;

In Oregon and Washington the closed season shall be between December 16 and October 1;

In Florida, Georgia, and South Carolina the closed season shall be between February 1 and November 20;

In Alabama, Louisiana, Mississippi, and Texas the closed season shall be between February 1 and November 1;

In Tennessee the closed season shall be between December 16 and October 1;

In Arizona and California the closed season shall be between February 1 and October 15; and

In Utah the closed season on snipe shall be between December 16 and October 1, and on plover and yellowlegs shall be until September 1, 1918.

Woodcock.—The closed season on woodcock shall be between December 1 and October 1 next following in the Northern States and between January 1 and November 1 in the Southern States, except as follows:

Exceptions: In Connecticut, Massachusetts, and New Jersey the closed season shall be between December 1 and October 10;

In Rhode Island the closed season shall be between December 1 and November 1;

In Pennsylvania and on Long Island the closed season shall be between December 1 and October 15;

In Delaware and Louisiana the closed season shall be between January 1 and November 15;

In West Virginia the closed season shall be between December 1 and October 1; and

In Georgia the closed season shall be between January 1 and December 1.

Whether or not these closed seasons will prove sufficient to arrest further diminution of the shorebird population only time can tell. Meanwhile, it is desirable to have further protection in fall along the seashore. Here the modern idea of bird refuges can play a most important part, and fortunately it can be put into effect at comparatively small cost. The beaches of the Atlantic coast are largely given over to summer cottages of city people. A great majority of these temporary dwellers-by-the-sea take no satisfaction in killing shorebirds and would far rather welcome to the sands in front of their homes such lovely visitants from the North, birds of delicately shaded plumage and graceful motion. A strong, concerted movement would obtain the cooperation of a large majority of these cottagers in a campaign for the stopping of all shooting on the beaches; while their united efforts would go far toward creating a public sentiment which would bring about the adoption and observance of local regulations which would be an efficient aid in the enforcement of the Federal law.

The miles of seashore recently withdrawn from the hunter, in the Ward-McIlhenny bird reserves of southern Louisiana

and Mrs. Russell Sage's Marsh Island near by, are striking examples of what can be done in this direction by private initiative. The proposed reservations on the Florida coast are still more important from the shorebirds' standpoint. Scattered along this coast and also on that of Texas are large areas seemingly especially intended by nature to meet the particular needs of shorebirds. As they congregate in these resorts in great numbers for many weeks of the year, such places should next be brought under the control of the shorebirds' friends.

The beneficial results of the above-outlined efforts at shorebird protection should be manifest within a very short time, because almost all the shorebirds, except the woodcock, have their breeding grounds in Canada, where they find acceptable nesting conditions and an abundance of food. A large percentage nest in the Arctic, where they are free from all interference of human beings, and even in the settled parts of Canada they are not subject to slaughter, for Canada has a first-class game law for shorebirds that is rigidly enforced. Birds which gunners of the United States allow to escape to their breeding grounds may there have an excellent opportunity for raising a numerous progeny.

CONCLUSION.

From the foregoing paragraphs it is evident that shorebirds are an important asset in the country's wealth; that their recent decrease in numbers has been due priucipally to excessive shooting; that State laws have proven inadequate to check this diminution; that the only hope of preserving shorebirds lies in Federal legislation; but that with a wise Federal law, wisely administered, and with an awakened and enlightened public sentiment to aid in its enforcement, there is every reason to believe that the shorebirds will again become common enough to enliven the beaches and lake shores with their welcome presence and to afford the hunter a fair amount of legitimate sport.

THE PREPARATION OF FERTILIZER FROM MUNICIPAL WASTE.

By J. W. Turrentine,
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PRESENT agronomic practice demands that certain materials, called "plant foods," or soil amendments, shall be added to the soil to take the place, presumably, of those substances removed from the soil with the harvested crop. It is conventional to regard these as four, and, accordingly, commercial fertilizers are designed to supply them. These, then, constitute the essential ingredients of commercial fertilizers and are potash, phosphoric acid, nitrogen, and lime. Potash is added in the form of salts of potassium, such as the sulphate or chloride (muriate); phosphoric acid, as bone phosphate (ground bone), or rock phosphate, usually treated with sulphuric acid (acid phosphate); nitrogen, as salts of ammonia, such as ammonium sulphate, as salts of nitric acid, such as sodium nitrate, or as vegetable or animal compounds carrying nitrogen, such as cottonseed meal or dried, ground fish (fish scrap). Lime is not rated in mixed fertilizers, hence its occurrence therein is incidental. It is added to the soil alone as ground limestone or as slaked or unslaked lime.

Potash is imported almost altogether from Germany, while among the fertilizer resources of the United States there are extensive deposits of phosphate rock and unlimited beds of limestone. Carriers of ammonia are scarce the world over and are correspondingly dear. The national resources in these consist in large quantities of ammonium sulphate, a product recoverable from coal when it is distilled to prepare illuminating gas, constituting our present greatest source of nitrogen for fertilizer purposes and susceptible of large development; cottonseed meal, the greatest of the organic carriers; blood and other waste materials from slaughter-houses, such as dried blood and tankage; abundant fish not regarded as fit for food, from which to prepare fish scrap;

garbage tankage and so-called basic goods, the last named a mixture of horn, hair, etc. The higher grades and consequently the more valuable of the organic carriers are finding more profitable use as cattle feed and therefore are disappearing from the fertilizer trade. Their place must be taken by increased amounts of the inorganic and of the lower grade of organic carriers.

For the last named it is necessary to take the waste materials of an organic nature—animal or vegetable. These, it happens, are obtainable at present in largest amounts in cities, as products which are incidental to the daily life of the people, domestic and industrial, the amounts per person being insignificantly small, but in the aggregate of very large proportions. The disposal of these, with other classes of city waste, presents one of the most serious of municipal problems.

NATURE OF CITY WASTE.

Following is a tabular statement of the classes of city waste:

Ashes:
- Coal ashes.
- Wood ashes.

Rubbish:
- Paper.
- Wood.
- Rags and furniture.
- Leather, rubber, lint, hair.
- Metals.
- Glass and crockery.

Sewage:
- Street and roof drainage of rain water.
- Water from street washing.
- Trade waste (liquid).
- Household.

Street sweepings:
- Horse droppings.
- Leaves.
- Materials from excavations and construction.
- Pavement dirt.

Trade waste:
- Stable refuse.
- Sawdust, etc.

Dead animals:
- Large—Horses, cows, swine.
- Small—Dogs, cats, poultry.

Garbage:
- Trade (hotel, market, slaughter-house).
- Household.

COMPOSITION AND AVAILABILITY.

SEWAGE.[1]

The treatment of household and street sewage as generally practiced results in the production of an earthy sediment from the settling chambers; a clear, dilute solu-

[1] Since ashes and rubbish afford but little of fertilizer value they will not be considered in this discussion.

tion of the decomposition products of bacterial action on the sewage of a harmless ,and inoffensive nature; and the precipitated insoluble residue, known as sewage sludge, the last named being the only residue of the sewage which can be considered as at all available for fertilizer purposes. This is made up largely of fibrous material, containing much cellulose or cellulose-like substances. The chemical analysis of a number of samples of wet decomposed sludge gives the following figures: Wet sludge—moisture contained, 79.34 per cent; dry material, 20.66 per cent. Composition of dry material—mineral matter, 54.8 per cent; organic matter, 45.2 per cent; nitrogen, 1.56 per cent; fats, 6.41 per cent.[1]

The disposition of sewage sludge is one of the serious problems with which municipalities are confronted. The high water content and the tenacious manner in which its water is held constitute the great difficulty in the way of its utilization as fertilizer or in any other way. Because of its high water content it can not with profit be transported any considerable distance. To dry it artificially is quite impracticable, owing to the expense for fuel and the low value of the product. It is used for fertilizer in many instances locally by farmers who live within a convenient distance of the filter beds. In such cases it is delivered to the land by pipes and spread through ditches or in other manner, or it may be hauled to the land in barrels or tank wagons. As a rule, no charge is made for the sludge, since its removal is to the advantage of the operators of the sewage plants. The cost to the farmer, then, is only that involved in hauling and spreading. The results obtained from its use on the soil are good, though no better than one would predict from its analysis. The nitrogen present is only slowly available, its availability, of course, being measured by the rate at which the sludge decomposes in the soil. The tenacity with which it retains its water makes it of added value in keeping the soil moist. The grease carried by it can not be considered desirable, as its accumulation in the soil may prove detrimental.

For each inhabitant, it is estimated, there is a daily yield of 10.5 ounces of sewage sludge of a water content of 80

[1] From "Sewage Sludge," by Elsner, Spillman, and Allen, p. 144.

per cent. At this rate a city with a population of 100,000 produces 33 tons of sludge a day, or 12,000 tons a year. This would yield 2,400 tons of dry sludge a year. The 199 cities of the United States with a population of more than 30,000 each, aggregating 30,000,000 inhabitants, would produce 3,600,000 tons of wet sludge, or 720,000 tons of dry sludge, a year.

Sewage sludge is a possible source of combined nitrogen for fertilizer purposes. Since to dispose of it is imperatively necessary, methods of disposal may be looked to which, while not economical in the sense that the revenue from the product balances the expense of treatment, yet will be adopted as the most economical or expedient available. Perhaps the most promising of proposed methods is subjecting the dried or partially dried sludge to destructive distillation for the preparation of combustible gas. Depending on the manner in which this is done, various proportions of the combined nitrogen may be evolved as ammonia, easily recoverable as ammonium sulphate, one of the most useful of nitrogen carriers. The evolved gas, in the absence of a better use, may be made to assist in drying fresh portions of sludge which are being prepared for the stills. The potash and phosphate left in the residue are still available for use as a fertilizer base, while the value of the nitrogen is greatly enhanced.

The nitrogen content of dry sludge is about the same as that of soft coal. In the distillation of soft coal the major portion of the nitrogen is recovered as ammonia, amounting to about 20 pounds a ton, or 1 per cent of the weight of coal distilled. Assuming for dry sludge an equal yield, the 720,000 tons of sludge produced each year by the 199 cities of the United States with a population of over 30,000 inhabitants each would afford 7,200 tons of ammonium sulphate a year, of a value of $480,000.

The combustible gas obtainable from sludge is, on the average, about 6,500 cubic feet, while that from peat is 8,400 cubic feet, and from soft coal, 10,200 cubic feet.

STREET SWEEPINGS.

Street sweepings are mostly used for filling, a use to which they are adapted, since they contain large quantities of min-

eral matter and carry sufficient organic matter to insure a rapid growth of vegetation over the fills. Their use as fertilizer is not more general because their fertilizing value is relatively low and the expense of hauling is high. Their use on the soil has been attended with good success, however, since, as shown by the following analyses, they contain, in addition to a small percentage of nitrogen and potash, a large proportion of organic matter, which is of use in the improvement of the physical condition of the soil. The average composition of 21 samples of street sweepings, 18 from the streets of Washington (taken directly from the streets or from the dumps and consisting in some cases of fresh material, in others of rotted, and analyzed in the Bureau of Chemistry) and 3 from the streets of Berlin, is as follows: Nitrogen, 0.44 per cent; moisture (average of 13 samples), 32.24 per cent; ash (average of 13 samples), 47.84 per cent; organic matter (average of 13 samples), 19.90 per cent; phosphoric acid (average of 13 samples), 0.10 per cent; and potash (average of 13 samples), 0.21 per cent.

The values in nitrogen, in the undried samples, ranged between the extremes, 0.17 per cent and 0.73 per cent. Were this material rated on the basis of its nitrogen content, at a price per unit of nitrogen obtained for garbage tankage, $1.75 per unit, its value would be $0.30 a ton for the least valuable and $1.28 for the most valuable. The price actually obtained varies from $0.15 to $2 a ton.

From figures obtained in a survey of American cities of more than 10,000 inhabitants, conducted by the Bureau of Chemistry in 1897, it appears that 169 tons of street sweepings are collected annually for 1,000 inhabitants of urban communities. Of the total quantity of 1,064,957 tons reported in that survey, only 174,931 tons were used as fertilizer, while 673,791 tons were used for filling. At the above rate of collection for each 1,000 inhabitants, the 199 cities of the United States of a population of 30,000 and over yield more than 5,000,000 tons of sweepings.

Since the advent of the automobile in large numbers the value of street sweepings for fertilizer probably has been lessened, not because of any decrease in the proportion of organic matter, a result to be expected from the displacement of the horse by the automobile, but on account of the oil

dropped upon the streets by automobiles, which becomes mixed with the street sweepings. An examination of street sweepings in the laboratories of the Bureau of Soils has shown that they may contain as much as 2 per cent of mineral oil thus acquired. The belief that this oil is deleterious is substantiated by results reported in recent years as obtained in actual agricultural experience with street sweepings, as likewise by small-scale fertilizer tests made in these laboratories, in which the use of oil-laden sweepings, as they came from the streets, was compared with that of the same material after the oil had been removed from it by the use of the proper solvent.

DEAD ANIMALS.

Dead animals have such value for the manufacturer of fertilizer that any other method of disposing of them is to be condemned. The fertilizer materials obtained from them are equal, if not superior, to those obtained from high-grade slaughterhouse tankage, a nitrogen carrier of such value that it has to a large extent been withdrawn from the fertilizer trade and devoted to cattle feeding.

Various methods of disposing of a city's dead animals are in vogue at present, such as burying, cremating, and rendering. Of these, there is little to recommend burying. Rendering is to be commended, since it is the only method from which revenue is derivable. Cremation has a value only when an animal has died of some communicable disease, danger of the spread of which is minimized by the utter destruction of the animal. This probably is never a matter of any great importance except when the disease is communicable to man, since, in rendering, the parts cooked are thoroughly sterilized, and the hide and bones are confined to places and uses such that the spread of disease to other animals is not at all likely.

Dead-animal tankage is prepared by the simple process of rendering; the carcasses, in the case of large animals, are skinned for the preservation of the hides, cut up, and cooked in steam at high temperatures. The tankage is then pressed to remove the major portion of the water and to recover the grease, and is afterwards dried and ground. The products obtainable are hides, bones (where their value as such is greater than when sold as an ingredient of the tankage),

grease (tallow), and tankage. It is stated that these products, as recovered from a horse of the average size and condition, have a total value of about $10. This must not be taken as the profit derivable from rendering such a carcass, but only as the proceeds from the sale of the products. The profit made is determined by conditions.

The composition of dead-animal tankage is doubtless approximately the same as that of high-grade slaughterhouse tankage, a typical analysis of which shows a content of about 8 per cent nitrogen and 10 per cent bone phosphate. This would bring a price in the wholesale market of about $20 a ton.

The annual yield in dead-animal tankage at present is roughly 8,500 tons, prepared from about 34,000 tons of carcasses. This has a value of about $170,000, which represents only a fraction of the amount which could be produced were advantage taken of the full number of carcasses available. The gross weight of these which can be counted on as a source of raw material for the production of dead-animal tankage is, roughly, 4 tons a year for each 1,000 inhabitants. On this basis the 199 cities of the United States of a population of 30,000 and over should yield 25,000 tons of tankage a year, of a value of $500,000.

GARBAGE.

The greatest problem in sanitation with which the city has been confronted is the proper disposal of its sewage. That problem, it may be said, is solved for the time being, at any rate, though without the development of any method whereby any useful products are being extracted from the sewage. At present it represents an absolute waste, and its disposal a monetary loss, not only in providing the immense volumes of water required to move it, but also in the operation of those processes required to render it innocuous.

With the exception of sewage, garbage is the greatest class of waste materials whose disposal presents a serious municipal problem. Garbage is unlike sewage in this respect, that its value has been recognized from the beginning, and various methods of disposal have been devised with a view to the recovery of its useful constituents. Militating against this, on the other hand, has been the desire to get rid of it with

as little manipulation as possible, because of the objectionable character which it usually bears and the readiness with which it becomes a nuisance.

Composition.

The composition of garbage is almost indeterminate, because of the great variety of material entering it. It may contain parts of all of the substances which enter a household. Besides the remnants of food materials, to which it owes its origin and likewise its value, it commonly contains pieces of crockery and glass, and tin cans. These must be regarded as foreign to garbage, since their presence is in violation of many city regulations; yet they contribute their quota to the complexity of the problem of garbage disposal.

The composition of garbage is illustrated by the following report of analyses: One ton of garbage contained 7 per cent (140 pounds) of rubbish, 71 per cent (1,420 pounds) of water, 2 per cent (40 pounds) of grease, and 20 per cent (400 pounds) of tankage. The yield in grease is usually about 3 per cent.

Methods of Disposal.

The methods of disposing of garbage in use in the cities of the United States are feeding to swine; dumping or burying in clay pits, gullies, swampy areas, and vacant lands; dumping at sea; incinerating; and rendering. The most important from the standpoint of sanitation are incinerating and rendering, and these alone will be considered in this discussion.

Incinerating.

A number of the larger cities of the United States have installed incinerators for the combustion of ashes, rubbish, and garbage together. Their operation is attended with success, from the sanitary point of view, and they offer a simple solution of the problem of disposal. Where this method is used a single collection is made, which simplifies that operation also. The economy of the method is open to serious question.

An incinerator, essentially, is a furnace of large capacity, designed for the complete combustion of the charge under forced draught, the destruction of all odors, and the elimination of dust and smoke. As far as possible the charge is fed

into the furnace and the clinker or ashes are removed mechanically, although in no case is hand labor entirely eliminated. Some effort usually is made to utilize the heat for the production of steam.

RENDERING.

The rendering of garbage for the preparation of grease and fertilizer consists essentially in cooking in steam, pressing to remove water and grease, drying, extracting—washing with gasoline—to recover the remaining grease, and grinding. Rendering is conducted in apparatus of various designs and is varied to conform to the ideas of the operators. Plate XXIV, fig. 1, shows a modern rendering plant.

AN ECONOMICAL PROCESS.—A modern system of rendering, one thoroughly demonstrated and found to be economical and efficient, depends upon the use of apparatus which admits of an almost entirely automatic treatment of the garbage. From the beginning of the operation to its end the material is moved almost altogether by machinery.

The wagons bringing the garbage to the rendering plant are weighed and driven into the receiving house, and their loads are dumped, through openings in the floor, into a cement vault beneath. The garbage, thus disappearing from sight, never reappears as such, for through the bottom of the vault, where the garbage can slide upon it, moves a steel conveyor, the bucketlike sections of which gather up suitable portions and transport them to the top of the tank house, the entire distance through a tightly inclosed boxwork of sheet iron.

In the tank house are ranged a number of upright, cylindrical, iron tanks, perhaps 15 feet in height and 5 feet in diameter, in which the garbage is placed for cooking. (Pl. XXIV, fig. 2.) In top and bottom are openings, with tight-fitting covers, for charging and discharging, respectively. A few inches from the bottom a false bottom is constructed of perforated steel, which acts as a screen or filter for the separation of the solids from the liquids after the cooking has been finished. The solids are removed through the lower door, which, therefore, is situated above the false bottom. Live steam may be admitted at top or bottom of the tank, as desired.

The garbage, to the amount of about 10 tons, is fed into the top of the tank automatically by the conveyor, which brings it from the receiving house. When the tank is filled the top is securely fastened, and steam, at a pressure of about 40 pounds, is admitted near the bottom. When the cooking is completed, as indicated by the odor of the garbage, the steam is admitted at the top of the tank instead of at the bottom; then, with the drainpipe, which enters beneath the false bottom, open, the downward pressure of the steam drives the water and liberated grease through the solids held on the perforated plate, the effect being produced of a filter press for the effectual separation of solids and liquid. This accomplished, the cooked garbage is raked out and transported by conveyor into a drier. The type of drier in common use in this industry is the direct-heat, rotary, hot-air drier, an insulated iron cylinder mounted slightly out of the horizontal on roller bearings, upon which it rotates. The tankage emerges therefrom with a moisture content of about 7 per cent.

From the drier, the tankage is carried to the extractor, a cylinder of large capacity, mounted horizontally so that it can be rotated on a horizontal axis. It is provided with a single opening for charging and discharging, and, for the purpose of admitting gasoline and steam, is entered at one end by a pipe passing through its axis. The tankage is washed two or three times with gasoline until the grease is removed, a result indicated by the absence of color from the emerging gasoline. To recover the not inconsiderable amount of the solvent retained by the tankage after the main portion has been drawn off, steam is blown through it, vaporizing and displacing the gasoline. The mixture of steam and gasoline emerging is then condensed in water-cooled copper coils, the current of steam being continued until no more gasoline appears in the condensate. At this stage, the extracted tankage is again moist from the steam which has remained in it. It may be dried a second time, or conducted directly to the mill for grinding. After grinding, it is stored or loaded for shipment. It is shipped in bulk.

The water and grease drawn off from the tanks after cooking are conducted by gravity to suitable vats, where, after the grease has risen to the surface of the water, it is recovered by skimming.

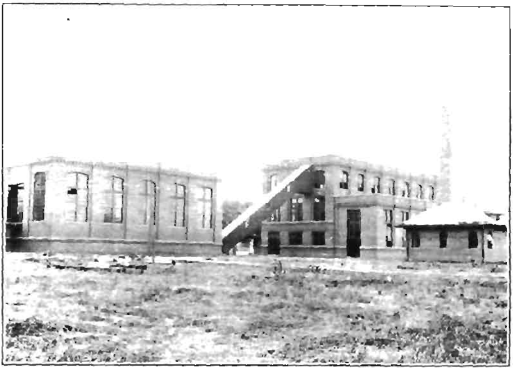

FIG. 1.—MODERN PLANT FOR RENDERING GARBAGE.

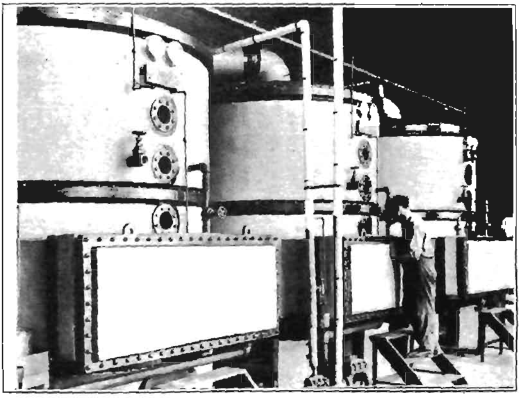

FIG. 2.—TANKS FOR RENDERING GARBAGE.

The grease, it is seen, is recovered in two phases of the operation; it is skimmed from the tank water and is dissolved from the dried tankage with gasoline. The gasoline solution of grease is distilled, the gasoline being evaporated and recondensed, leaving as a residue the grease which it held in solution. Thus the gasoline may be used repeatedly with a loss of about 6 gallons per ton of dry tankage. The grease from the two recoveries is pumped while still hot to storage tanks, from which it is run into tank cars for shipment.

Possible improvements in process.—This in essence is the process of rendering at present regarded as most economical, although there are various other processes in vogue. The process outlined fails to conform in certain particulars to the ideal. For example, in cooking with steam, a large volume of water is added; this must be removed almost completely before the last of the grease is recoverable. This volume of water, to recover all of the nitrogenous ingredients of the garbage and to prevent pollution of neighboring streams, must be evaporated. The utilization of the stick water as a part of the tankage necessitates a further drying of that. Likewise the grease is removed in two stages, first after tanking and again after drying, by extraction with gasoline. An ideal method would obviate the addition of water and would provide for the recovery of grease in one operation.

Two methods are described which provide these two improvements. One prescribes drying without preliminary treatment and then degreasing, a process of apparently great simplicity, but involving troublesome details; the other, cooking in grease (from former operations) in tightly inclosed tanks, the heat being supplied through steam coils. The excess grease is drawn off, while the balance is extracted with gasoline, thus necessitating only one degreasing and obviating drying. Likewise, the process is necessarily inodorous; and all the constituents of the garbage are conserved.

Products.—Grease and tankage constitute the valuable products obtained from the rendering of garbage. The composition of the latter is expressed by the following figures, the average results of a large number of analyses: Moisture,

3.50 per cent; ammonia, 3.43 per cent; bone phosphate, 5.46 per cent; potash, 1.31 per cent.

Tankage is used only as fertilizer. Its use alone, without mixing, has been attended with success, though most of it finds its way into mixed fertilizers, in which it is regarded as a base to which to add more concentrated fertilizer materials for the preparation of brands of desired composition. For such a purpose it appears well designed, since an organic base for mixed fertilizers is regarded as essential to the proper state of pulverulence. It is especially desirable in view of the fact that its place may be taken by materials totally lacking in fertilizer value.

Its trade value is based on its analysis. If the ammonia and potash which it contains were rated as available, its maximum value in the retail market would be about $11 per ton, and in the wholesale market $9. The price actually obtained in the wholesale market varies, but may be expressed as an average of $6.50 per ton, or, instead of a price of $2.65 per unit (a "unit" being 1 per cent), which is the price obtained for nitrogen in the high-grade ammoniates, only $1.70 per unit is offered.

The reason for this seemingly low price is that present analytical methods by which fertilizers are rated fail to show that the nitrogen contained in garbage tankage is in the available form. When this fact is stated on the label of the fertilizer containing garbage tankage the idea is conveyed, doubtless unintentionally, that the fertilizer is inferior on that account, whatever the source or form of the main nitrogen compounds present. Thus the advantage derivable from its use as a base is discounted and its use is discouraged. The price offered for it, therefore, is low, almost nominal. It is not intended here to convey the idea that the nitrogen carried by this material is available, since no experiments on a rational basis have been performed to show whether it is available or not; only methods of analysis based arbitrarily on radically different materials have been applied to test its availability, and on these rest the opinions regarding its availability. There is no evidence that these methods even remotely approximate a measurement of the rate of decomposition of garbage tankage in the soil, which is the ultimate measure of avail-

ability. And it is obvious that a mixed fertilizer is more valuable and should have higher rating when it contains as a base materials which ultimately will surrender their valuable constituents to the use of the growing plant than one whose base is of no potential value whatever. The use of garbage tankage, furthermore, is discouraged by the laws of certain States relating to fertilizer control, an enactment now under contemplation by still other States. It is extremely desirable that such moves be postponed until the merits of the case shall have been determined on a more rational basis.

When it becomes known what portion of the nitrogen carried by vegetable matter (of which garbage tankage is largely composed) is actually available, and the advantage accruing from the employment of such a base becomes recognized, then a better price and probably a more just one will be offered for garbage tankage, and, as a result, greatly increased amounts of this potentially large source of fertilizer will be made available for the agriculturist.

The grease recovered from garbage finds a market among manufacturers of soap, lubricants, etc. The price obtainable is influenced by the quality. In Columbus, Ohio, during the year 1913, an average price of 3.7 cents per pound was obtained.

ADVANTAGES OF RENDERING.—The disposal of garbage on a large scale has been accomplished, as has been shown, by two methods, both of which are regarded in certain quarters as satisfactory. The foremost demand made of any method, that it shall be sanitary, is met by both. To some the combustion method may appear the more sanitary, since it prescribes the utter destruction of the organic and therefore insanitary materials. But the temperatures attained in the rendering process are sufficiently high to make absolutely sterile and innocuous all the constituents of the garbage, so that in that particular this treatment is altogether as sanitary as combustion. The extent to which the garbage is handled before delivery into tanks or furnaces is about the same, giving an advantage to neither method. A decision between the two must be reached on the basis of their relative economy, and this must be determined for each municipality. An advantage possessed at the outset by

rendering is that salable products are obtained which pay for the final disposition (the rendering) and partially for collecting, while from combustion as now practiced no revenue is derived. Theoretically steam may be generated (and actually is) from the combustion, though the difficulty of attaining a temperature high enough for the combustion of the garbage is so great that in some instances additional fuel (of low grade) must be supplied. And where steam is generated it is permitted in certain cities to dissipate itself because of laws forbidding its sale or because the situation of the furnaces makes its use by the city impracticable. Clinker is mentioned as an additional possible source of revenue but practically is of little value, since it is mixed with unfused metal, cans, and wire, which add greatly to the difficulties of its handling. Likewise the low temperature maintained in practice in these furnaces results in much more ash than clinker.

The two processes differ in cost of collecting, since for combustion all classes of refuse are collected together, while for rendering garbage, ashes, and rubbish are collected separately. Because three collections are made in the latter case it must not be supposed that the cost of collection will be three times as great. It is conceivable that the cost of separate collection may not be greater than a collection of the three together, when the routes taken by the wagons are conveniently laid out, provided in both cases the same weight of material be hauled the same distance. In combustion, while advantage is taken of the fuel value of the ashes, which we have seen may contain 20 per cent of unburned coal, at the same time a loss in economy lies in the fact that the ashes are handled twice, twice loaded and twice unloaded, and in addition are put through a furnace; while in the triple-collection method they are loaded once and hauled directly to the nearest dumping ground. In either event they must be hauled to a dumping ground. Again, with the single-collection system no recovery is easily possible of the valuable parts of the rubbish, since this, once mixed with garbage, is no longer fit for recovery. Likewise its fuel value is expended largely in the evaporation of the large proportion of water carried by the garbage. However, no hard and fast rule can be laid down, since costs of collec-

tion vary with each city, being determined, among other things, by the topography and geography of the city, the number and location of loading stations, and the situation of the rendering or incinerating plant.

On the basis of figures obtained in the operation of a number of reduction plants, it is shown that the average cost of reduction is $2.41 per ton, and the gross receipts $3.30 per ton, giving a profit of $0.89 per ton raw garbage. On the other hand, the average net cost of incinerating per ton of garbage, as obtained in a number of instances, is $2.11 per ton. In one of the cities considered there is a credit from power generated of $0.22 per ton of garbage incinerated. When considerations of costs of collection are excluded, the rendering of garbage is distinctly more profitable.

The present annual production of garbage tankage is, roughly, 150,000 tons, with a value, at $6.50 per ton, of $975,000. This amount is obtained from about 1,200,000 tons of raw garbage, rendered in about 25 plants, all but five being privately owned or operated.

One feels inclined, for the sake of conservation, to advocate the rendering of garbage instead of its incineration, since in the former process, as has been seen, useful products are obtained and in the latter these are destroyed with no adequate returns. It is perhaps too much to expect a municipality to tax itself for the sake of such a sentiment and to settle the question as to which method of disposition shall be adopted for reasons other than the purely economical. Were only the total expenses involved estimated to be the same, it would be criminal waste to burn material of such aggregate value as rubbish and garbage.

What the farmer can expect from this source of fertility is problematical. From the success now being obtained with the two important methods of disposal it appears that the results are distinctly in favor of rendering. It is entirely within the realm of possibility, therefore, that all the garbage now collected by municipalities will be devoted to the manufacture of fertilizer and grease. The statistics of the United States Department of Commerce show that in 1909 approximately 2,700,000 tons of garbage were collected in the cities of the United States having a population of 30,000 inhabitants and over. This, if rendered, should yield annually

400,000 tons of dry tankage, of a value of $2,500,000. Such a development of the industry would have to be preceded by the perfection of methods of treatment which would make rendering on a smaller scale economically possible, and bring about an increase in the uses and demands for the grease.

Fitting, indeed, it would be if the stream of useful substances now flowing in great volume from the farm to the city and representing a constant and tremendous drain on the fertility of the soil could be turned back, even to this small extent, to the soil. So much of the waste of a city is lost irretrievably that an especial effort should be made to conserve those valuable elements of garbage whose recovery in the form of tankage is so simple and profitable.

THE AMERICAN FARM WOMAN AS SHE SEES HERSELF.

By Edward B. Mitchell,
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THE Secretary of Agriculture recently asked the housewives of the department's 55,000 volunteer crop correspondents to suggest ways in which the Department of Agriculture could, in their opinion, work directly for their benefit.

In reply to this inquiry, 2,241 letters were received during the past year, coming from every section of the country and from writers who differed most widely in education, circumstances, and opinions. In a country of a hundred millions, accurate statistics, expressed in percentages, can not, of course, be based on the data afforded by a few thousand letters, but as a bird's-eye survey of woman's life on American farms this collection opens the way for much vigorous, constructive work.

In the first place, it is apparent that much of the work that has already been done has not yet reached those whom it was designed chiefly to benefit. Many correspondents urge the department to do things that have already been done, to provide information on subjects that have been exhaustively treated in publications which may be had for the asking. But the women do not know of these publications, and consequently they do not ask for them. From practically every one of the Southern States at least one writer called attention to the fact that the women of her district were in general unaware of the existence of the very bulletins that had been written to help them, and this condition of affairs is by no means confined to the South. It is true that the Farmers' Bulletins have been widely circulated, but a circulation that would make a commercial publisher's fortune may still, from an educational point of view, leave much to be desired.

That an increased circulation is to be desired, these letters leave no doubt. The demand for fuller knowledge, for knowledge that will enable the women to make their homes healthier, their lives brighter, is the most striking note in the whole collection. Information is wanted on every subject, from the management of gasoline engines to the care of babies: and, although the skeptic may question whether agricultural and domestic science can ever justify these women's unbounded confidence in its ability to revolutionize the conditions of life, one must remember that many things which the dweller in cities takes for granted are in the country still rare or unknown luxuries. The farm woman striving to do her work with the same equipment that her grandmother did hers finds herself confronted with greater difficulties. The advance in the ease of living elsewhere affects her chiefly by drawing away those from whom she might otherwise obtain assistance. She feels herself at a disadvantage from which she suffers both in body and spirit. It is this that is responsible for much of what there is of discontent in the letters.

This thirst for information can not, of course, be satisfied with bulletins alone. In many cases, indeed, the usefulness of these as a means of general education is severely criticized. It is asserted that those who need them the most read them the least, and that even those who do read them are not likely to make radical innovations in their accustomed methods, or to invest precious money in expensive improvements, merely on the cold impersonal recommendation of the printed page. They ask for ocular demonstration in their own or their neighbors' homes. The value of such demonstration work is, of course, too well known to educational authorities to need discussion here. As a result of the Smith-Lever law, recently enacted by Congress, it is probable that, within a few years, $8,000,000 will be spent annually by the various States, aided by the Federal Government, in just such work in agriculture and domestic science. It is interesting to note, however, the emphasis which women who never heard of the Smith-Lever act lay upon the need for lectures, for traveling, for educational moving-picture exhibitions, for demonstrations of labor-saving devices—for anything and everything, in short, that will bring home to the people the possibility of better living.

Even to enumerate the suggestions which are put forward as a means to this end is out of the question. Many are sound and thoughtful—many, indeed, have already been adopted by the department, the agricultural colleges and the experiment stations—and others are naturally vague and impracticable. The point of importance is that the farm women want to learn; they want to improve their homes, but they admit frankly that to-day they don't know how. Those who do know want their husbands to be told also. With a touch of bitterness, many women declare that attention has been concentrated upon improvements in agriculture; the value of scientific care of live stock is thoroughly understood by progressive farmers who do not give a thought to conditions in their own homes; barns and wells and stables are planned with a keen eye to minimizing the cost of labor; but no attention is paid to the waste of labor indoors. The farmer invests capital in his farm; it does not occur to him to invest capital in his home. It simply does not occur to him. The very women who protest most strongly against the facts deny that stinginess is responsible. Their husbands do not understand, they say, do not realize that the house as well as the farm is a business, the management of which may be either progressive or antiquated.

As labor has become scarcer and more expensive, the department has aided the farmer with information about labor-saving devices and labor-saving systems of farm management. His wife asks for the same assistance. Lack of help inside the house means that the farm woman must employ herself incessantly with the most routine tasks, from which prosperity brings no relief. Indeed, in the eyes of some writers, prosperity merely means more work. "The farm," writes one woman from Michigan, "is run for the benefit of the farm and not the family. Of what use is it to buy more land to raise more corn to feed more hogs to buy more land?" Abundant crops need hands to harvest them, and the farm woman must feed the hands. To many this is the last straw. Already overdriven, they object to having the additional burden of the hired help thrust upon them; they object to the presence of the men at their tables and in their families. For them the labor problem is two

edged. They can get no help themselves, and the help their husbands have they must care for. Moreover, it is said, the character of farm labor has deteriorated to such an extent in recent years that it is no longer possible to take the hired man into the family. He remains an intruder and an affliction which, both as housewife and mother, the farm woman earnestly longs to be rid of. How she is to do this is, in its way, almost as much a problem as how she is to get the domestic help she herself requires; but in a number of letters cooperation is suggested as a possible remedy. If the farmers of the neighborhood would unite, it is argued, to provide quarters for their men, they could be taken care of just as cheaply and with far less trouble than under the present method of billeting them upon their employer's family.

Thus, because of the lack of modern labor-saving devices and proper heating, lighting, water, and sanitary systems, of the inability to obtain assistance when it is imperatively demanded, and the burden of outsiders, "overwork" is a common and widespread complaint. To this is added, in many cases, the depressing conviction that the work all goes for nothing; that is, there is no substantial evidence of appreciation in the form of cash. The proceeds of the chicken yard and the vegetable garden, usually regarded as woman's domain, are not credited to her individually but are lost in the general farm income. In consequence, the farm woman is disposed to resent this outdoor work as an imposition, and instead of developing to its fullest extent what might be a considerable source of profit, she permits her interest to remain at the minimum. Although the Department of Agriculture can not very well interfere with the domestic arrangements of a farm household, it is evident that if the results of woman's work took a form as tangible as ready money, much more satisfaction would be derived from the doing of it.

In this connection it is significant that agricultural authorities have repeatedly stated that the average American farm does not maintain a sufficient quantity of live stock; that more milch cattle and more poultry could be raised with advantage not only to the grower but to the whole country. From these letters, however, it is evident that where the

men are fully occupied in the fields and no help is available in the house, the already overworked women on whom will fall the burden of caring for the additional cows and chickens will not take kindly to the suggestion. If an adequate supply of labor, male or female, could be directed to the farms, better management in house and field alike would be more possible. For this reason many urge the establishment of official employment bureaus to secure a better distribution of the available labor, and in particular to divert the stream of immigrants from the cities to the country.

That the immigrants need this official persuasion is perhaps due to the same causes which lead a number of writers to express discontent with farm life. Of these causes, the chief are loneliness and overwork. Loneliness, isolation, and the lack of social and educational opportunities form the text of many letters. These come from every part of the United States, and there is no evidence to show that the sentiments expressed in them are more general in one section than in another. It appears to be a question of the individual farm rather than the county or State. Probably much of this loneliness is the direct result of the overwork which confines the women to their homes, cuts them off from their neighbors, and deprives them of all sense of contact with the world at large. The men do not suffer from this so much, it is said, since their business dealings necessarily bring them into contact with new faces and new ideas. The lack of good roads is also held responsible for increasing the difficulty of social intercourse, and one woman complains that changes in agricultural practice have sent light horses, suitable for driving, from the farm. She has, therefore, no way of getting over the country and must perforce stay at home, whether she has the time to go out or not.

The isolation is objected to, however, by many women not so much because it is a bore as because it leaves no opportunities for development and improvement for themselves and for their children. The question of education looms large in their minds, but on this point there are considerable differences of opinion, and the tendency to consolidate the rural schools is cordially condemned by a number of correspondents. To many "the little old red school house" is evidently dearer than advanced theories of education, but there

are other than sentimental reasons for the objection to substituting for it the modern central school. The long journey to the latter involves exposure which, in winter weather, is, in the mother's eyes, too severe for young children, no matter how adequate the service of the school wagons may be. Moreover, many farm women fear the evil influence of towns and miscellaneous company upon their children. One Vermont woman complains specifically, for example, of the fact that in the school wagon her boys and girls must listen to unsupervised conversation for several hours each day. On the other hand, many correspondents realize that their insistent demand for a modern education for their children can not be met by the old-fashioned, ungraded, unequipped rural school. They are, therefore, as urgent in advocating the consolidated school as their neighbors may be in opposing it.

But whether in the "little old red schoolhouse" or in the central school, the women want their children prepared for the practical aspects of life. Under the present system, it is argued, the schools educate the young away from their life work. A few content themselves with urging the abolition of the so-called "frills" in the district schools, but the majority look to the establishment of agricultural high schools in the rural districts as a more efficient remedy. These schools, it is said, should not only supply the needs of those who, seeking a higher education, can now obtain it only in towns where they quickly lose all sympathy with farm life, but should also provide instruction in agriculture and domestic science. The importance of domestic science is dwelt on particularly as the only remedy for the tendency on the part of girls to despise all housework as a species of degrading drudgery. This attitude makes them not only inefficient but unwilling as well. With greater knowledge would come greater satisfaction in the performance of their duties.

What the farm women want for their children they want for themselves as well, but since they can no longer go to school they ask that the school be brought to them. The demand for practical information to be supplied through the medium of bulletins, personal demonstrations, and lectures has already been noted, but the desire for knowledge by no

means stops here. The farm women look to educational extension not only to help them in their work, but to aid them in finding pleasure outside of their work. Courses of reading planned by the Government, with circulating libraries to render the necessary books accessible to all, and the utilization of the local schoolhouses for lectures and social purposes are favorite suggestions in this connection. It is true that to some a circulating library suggests nothing more important than easy access to the latest fiction, but in general there can be no doubt of the sincerity and prevalence of the yearning for a culture that will open their eyes to the beauty and joy of life.

That such culture requires effort to receive as well as to give is appreciated by the great number of correspondents who ask from the Government not so much material assistance in the shape of libraries, instructors, and meeting places as leadership in organizing to obtain these aids for themselves. Cooperation is the remedy that suggests itself to many minds for the evils, mental and physical, that spring from the isolation, hard work, and limited means which are the controlling factors in so many of the farm women's lives. In the organization of women's clubs and cooperative societies of every kind, it is pointed out, Government agents should be the natural leaders. Not only are they familiar with the methods that have proved successful elsewhere, but their position gives them a certain influence in the community not so likely to be enjoyed by a private individual, for it may be said in passing that throughout these letters the note of respect for Uncle Sam's wisdom is apparent. Properly organized and directed, it is expected that the women can do much to help themselves. On the purely material side the successful operation of such cooperative institutions as creameries and cheese factories has suggested the extension of the principle to such domestic matters as washing and baking. In sections where creameries are common a favorite idea is the establishment of a cooperative laundry to be run in connection with it. Advocates of this plan usually ask of the department only information—the cost of putting such a scheme into operation, the number of patrons necessary, etc. Butchering, canning, and the feeding of hired hands are also mentioned as fields

for profitable cooperation. As has already been said, however, many correspondents look to organization to do more than lighten the domestic drudgery. By its aid they hope to end the isolation and loneliness, the monotony and intellectual barrenness of their lives.

In singular contrast to this spirit of sturdy self-reliance is the attitude of most of the correspondents who discuss questions of finance. Few observe or even appear to be aware of the existence of the distinction between borrowing to obtain productive improvements and borrowing as the easiest method of obtaining a convenient supply of spending money. The need for "cheap money" is voiced vigorously, but few appear to concern themselves with its repayment. Over and over one comes upon the naïve assertion that if the writer's husband could only borrow a thousand dollars or so at a low rate of interest she could have many comforts now lacking. That ultimately the thousand dollars must be repaid as well as the interest does not apparently enter into her calculations. On the other hand, it is undeniable that the difficulty of obtaining sound and justifiable loans on reasonable terms works real hardship in many cases. Coupled with this grievance is the familiar belief that the producer receives far too small a proportion of the value of what he produces.

These problems belong to the field of general agriculture and are therefore, strictly speaking, outside the scope of the present inquiry. The fact, however, that in their replies to the Secretary's letter so many housewives discussed these topics, stating expressly that whatever benefited the farmer benefited them, is significant. These women do not consider themselves as a class apart, with interests distinct from those of the general community. They do not ask for special privileges. They are eager to secure a healthier, broader, better life for their families and for themselves. Broadly speaking, they believe that the Government can help them in their struggle in two ways—by economic legislation that will make agriculture more profitable, and by advice and education that will enable them to make the best of what they have.

SUGGESTIONS FROM AUSTRALASIA TO AMERICAN SHEEP RAISERS.

By F. R. Marshall,

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THE history of sheep raising in the United States relates numerous and radical changes. Present conditions do not give promise of sufficient supplies of mutton and wool to insure consumers of reasonable prices in the future. In 1909, 4 per cent of the meat used in American homes was mutton or lamb, while in the same year the United Kingdom used 22 per cent and France 11 per cent of mutton and lamb in their meat diet. Recently, however, American housekeepers have manifested a greater appreciation of the economy of a larger use of mutton and lamb. If the prices of these meats remain at a reasonable level their increased use and production will do a great deal to offset the seriousness of the beef question.

In the face of these considerations it is disturbing to realize that the numbers of sheep in the United States decreased from 61½ millions in 1900 to 52½ millions in 1910, and from 1911 to 1914 there was a further decrease of 7 per cent. The effects of this decline upon the meat trade have been retarded owing to the marketing of stock that should have been kept for breeding.

In contrast to this state of affairs, in New Zealand and Australia sheep raising is considered to be a safe and profitable business, and except for seasonal conditions the number of sheep kept is steadily increasing in those countries.

Because of the different attitude toward sheep raising of occupants of land in Australia and in New Zealand, a contrast of the conditions affecting the industry and the methods employed in those countries with those prevailing in the United States is of timely interest. In 1914 the writer of this article spent six weeks in wool trade centers and in visiting woolgrowers and sheep breeders in the States of New

South Wales, Queensland, and Victoria. A longer time was spent in New Zealand. Some of the main points of difference between Australasian and American sheep raisers' methods and conditions, together with suggestions for improvement in this country, are discussed in the pages following.

CONTRAST OF AMERICAN AND AUSTRALIAN CONDITIONS AFFECTING SHEEP RAISING.

STATUS OF INDUSTRY.

Sheep husbandry was originally established in the United States as a farm industry and almost solely for the production of wool. With the occupation of the lands of the range States the center of the sheep industry shifted to the west of the Missouri River. On account of the cheapness of supplies of both wool and mutton from the West the industry declined in the farm States. More recently production in the West has failed to increase, in fact has declined, owing to use of land for other purposes and to fluctuating wool values. Present and probable future prices for mutton and lamb should encourage an increase in production which must come mainly from farming States. Eastern farmers are not eager to engage in a business in which most of them have had no experience and which their fathers were once forced to abandon. The United States now has about 50,000,000 sheep, the smallest number since 1901. In 1911 Australia had 93,000,000 sheep, which number had been exceeded but once before.

The sheep, even more than the cow, is the forerunner of closer settlement of new lands. In Australia much of the land is but poorly served by railroads. The product must first be hauled long distances and must ultimately go to over-sea countries. Because of this, wool has been the primary consideration. A very large percentage of the occupied land is used by pastoralists. Restricted rainfall will permanently limit large inland areas to grazing use. The evolution of Australia from the sheep-ranching through the crop raising and selling stage to an intensive farming system, in which sheep are essential to efficient management, is proceeding much more slowly than was the case in this country. Aus-

tralian sheep raising is therefore of greatest interest to sheep ranchmen who are to utilize the large tracts of western lands which make up most of the country's total of 361,000,000 of nontillable agricultural acres.

LAND TENURE AND CLIMATIC CONDITIONS.

The settled land policy of the Australian States has given their pastoralists an advantage not yet known in the United States. While policies differ somewhat in different States, it may be said for that country as a whole that there is no open land and no conflict in the use of public grazing lands. In the newest sections lands are leased in large areas and for long periods. This gives a degree of permanency to pastoral operations, the lack of which is largely responsible for continuing many western American flocks upon a "fly-by-night" basis. The lessee is safe in investing in fences, wells, and other improvements necessary to the proper conduct of his business, and, more important still, his holding is large enough and his lease long enough to encourage and justify the most careful study and liberal use of capital in breeding the class of sheep best adapted to the section.

Lands leased from the Government are subject to periodic revaluations for readjustment of rents, and when needed for farmers or smaller stock raisers are subdivided upon the expiration of the lease. In such cases the first lessee may purchase his homestead site, together with a fair holding of adjoining land, and receive compensation for improvements left upon the land relinquished.

Two natural factors, rarity of predatory animals and a favorable climate, render the path of the Australian pastoralist an easy one compared with the lot of the Western States sheep ranchman. The rarity of predatory animals makes the herding of the sheep unnecessary. This saves a great deal of labor and allows the sheep a more natural life. The ranches or runs are fenced into paddocks, varying in size from a few hundred to several thousand acres. The cost of building and repairing fences is by no means equal to the expense of herding sheep, and even if it were, the greater thrift of the sheep in paddocks and the fuller use of the grass would still favor fencing.

Winters are very mild and necessitate no provision for shelter or feed for the flocks. In some sections lambs are dropped in the Australian fall. Lambing ewes receive no special attention, except in a few of the select lots of the valuable stud flocks. Because of mild winters, there is no need for moving sheep from one section to another at the approach and close of winter, as is imperative in our main sheep-raising States. Sheep can and usually do remain continuously in the same paddock from one shearing time to another.

On the other hand, practically all of the sheep-raising sections are subject to the serious periodic droughts peculiar to Australia and which often completely destroy all sheep not artificially fed or moved by railroad to graze in sections that happen to have a surplus of pasture. The frequency and seriousness of these droughts retard a very rapid increase in the number of sheep, and yet it is doubtful if they constitute a more serious drawback than the more frequent but shorter periods of cold and storm to which American range flocks are exposed.

On the whole, the conditions peculiar to sheep raising in Australia impress one as much more favorable than those peculiar to American range sections. It would be impracticable for our sheep raisers to attempt to adopt the Australian system as a whole. At the same time, because of the enjoyment of more favorable environment, the Australian pastoralist has advanced and established principles and practices which this country can well afford to adopt and emulate.

AMERICAN AND AUSTRALIAN SHEEP RAISERS' POLICIES COMPARED.

In the manner of disposing of the wool clip and in the breeding of sheep to suit the country, America has much to learn from Australia. The backwardness of this country in these respects can be explained, but outside of the attitude of the sheepmen themselves there is nothing to prevent the improvement along these lines which is unanimously admitted to be both necessary and possible of attainment.

The policy of breeding our range flocks has been a vacillating one, if, indeed, it can be said to have been a policy at

all. The choice of rams is the main factor in determining the character of the flock. This choice has been governed by the price asked for rams, by the representations of sellers of rams, by the reports of what a breed has done in an entirely different section, and by any or all of a number of things; when the main considerations should always be the requirements of the peculiar country that supports the flock and the market that, in the average season, can best be catered to with maximum returns, not for a single season, but over a period of at least 10 years.

In the fall of 1913, after mutton had sold at high prices and wool on a low level, there was an unsatisfied demand for mutton rams while many fine-wooled rams remained unsold. In 1914, after higher prices for wool, the fine-wooled rams were again in demand. *High mutton too commonly means the use of mutton rams in sections that are* best adapted to wool production, while high wool brings fine-wooled rams into use in sections having natural advantages for mutton production. Under such management the flocks are not steadily improved in the points that limit their productive capacity or the value of the product. Each flock is of a mixed make-up, and neighboring flocks are too dissimilar to permit successful cooperation in either breeding or marketing.

With a clearer definition as to what is and what is not a grazing country, and with prospects for more stable prices for both wool and mutton, the American sheep raiser is more nearly ready now than ever before to study the peculiar needs of the country in which his holdings lie and to breed a sheep adapted thereto, resting assured that, although the value of his products may vary and he can not afford to neglect wholly either fleece or carcass, the income from sheep bred along any reasonable, definite line is assured.

The fact that the Australian flockmaster has not had his attention so seriously divided between mutton and wool is largely due to his wool interests having been so thoroughly understood and established that he was less easily tempted to abandon older ideas for something not proved to be permanently profitable to him. The number of mutton sheep raised is on the increase, and considerable crossing with mutton rams is being done in sections producing abundant

feed. Lambs raised from crossbred ewes are practically all disposed of. The older and larger flocks have been bred continuously for the economical production of wool for many years.

Although their conditions and market differ from ours, their ideas, resulting from years of study and experience, can be largely adopted by owners of American flocks who have established or wish to establish flocks with wool as an important consideration. The Australian's idea of what constitutes an economical wool-producing animal is governed not by the price per pound received for the greasy wool, nor by the weight of the fleece, but by the total value of wool produced per acre of land. The type of wool is closely associated with the type of sheep, and the type of sheep must be varied to withstand regional variations in altitude, temperature, rainfall, and vegetation. The Australian sheep breeder is governed in his choice of rams very largely by the type prevailing in those near-by flocks that yield the greatest value of wool and show the greatest vigor.

Partly as a result of observations in regard to the vigor of various types of Merinos under the harder conditions of more recently occupied lands, and partly as a result of changes in market values of the finer spinning wools, the type of Merino popular in Australia has undergone a marked evolution in the past 20 years. It is no longer attempted to produce wools of extreme fineness. In making this statement, Tasmania should be excepted. Tasmanian breeders still adhere to a sheep very similar to the Merino bred in Ohio. In earlier times they contributed much high-priced stock to the flocks of the newer and larger States, but of late years sheep similar to those formerly in demand have been neglected at the important sales.

The general effort in Australia to-day is to produce a wool described as "bold" and "robust." The wool described by these terms is in reality strong, or coarse, as Merino wools go. Compared with what is aimed at by American woolgrowers, it is decidedly longer and coarser, much of it running around 56's in spinning counts, while the former type and the present aim of American breeders is to produce wool that will spin in the neighborhood of 64 counts to the pound.

It is argued that the larger framed and stronger constitutioned sheep that produce this robust wool suffer less from heat, drought, and scant feed than do the smaller and less vigorous producers of ultra fine wool. The newer type also has fewer skin folds on the body and is easier to shear. This robust wool is lighter in oil than are the finer wools and possesses a whiteness and an attractive character not easy to secure when fineness is paramount. (Pl. XXV, fig. 1.)

The gain in the amount of wool produced per acre by the robust-wooled sheep more than offsets the extra price that has commonly been paid in the markets for the very fine wools. In addition to this, and favoring the production of stronger wools, the trade has shown a lessened appreciation during recent years of wools that class as 64's or finer, while the lower spinning wools have increased in popularity. American wools of the fineness formerly popular in Australia and still aimed at by our growers are included in one grade of "fine." The stronger and more robust wool is represented by our "medium" or "half blood." The course of Boston October prices for these grades for 15 years is shown in the following table:

Comparative prices (in cents per pound) of domestic wool in Boston, October, 1899–1913.

	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913
Ohio (unwashed):															
Fine	22½	18½	19½	21½	23½	24	27	26	27	23	28	22	20	23	20
Medium	25	23½	20	23	25	30	34½	33	33	26	36	28	25	30	23
Territory (scoured basis):															
Staple, fine	55	51	46	55	55	65	76	71	73	60	78	65	60	67	54
Staple, medium	50	48	44	50	51	60	70	66	68	52	70	57	52	60	47
Clothing, fine	50	48	43	48	50	60	72	68	65	53	70	58	50	60	48
Clothing, medium	48	47½	40	45	46	55	68	63	60	45	65	50	45	56	43

Ohio wools are quoted as grease wools, while Territories are quoted on a scoured basis. The stronger wools are therefore higher in the former case, because they carry less grease and shrink less in scouring.

The American woolgrower can not ignore the fact that the Australian grower has a thorough knowledge of the wool trade and has studied [illegible]ks, [illegible]ost thoroughly before concluding that the [illegible] number of lots p[illegible] the production of [illegible] ording to the i[illegible]

the stronger wools. Certainly we in this country need to aim more at producing a lighter shrinking and longer wool, and if in breeding for these qualities combined with a sheep of unusual vitality we do produce less very fine wool, the loss will not be to the woolgrower.

Other claims for the robust wool are that it retains its character in bad seasons or in a hard country, that it is not so easily pulled off on bushes, and that it is less likely to shed from sheep in low condition or poor health.

PREPARATION OF WOOL FOR MARKET IN AUSTRALIA AND IN THE UNITED STATES.

In no respect do the practices of American sheepmen compare so unfavorably with those of the Australians as in the methods of preparing wool for the market. Our deficiency in this respect very largely explains deficiencies in policies of breeding and management, the distinction between good and poor wools not being apparent to the producer under the existing plan of selling.

Practically all wool in the United States is sold by the growers at an agreed price per pound, sacked and weighed just as it is shorn from the sheep. The grower very seldom knows anything at all concerning his wool after it leaves the shearing shed. Since the buyer of the wool very seldom represents a manufacturing firm, the seller has no facilities for knowing in any detail how his product should be improved to enhance its value for manufacturing purposes. On our western State sheep ranches wool is considered ready for selling when each fleece has been tied together with twine and the lot tramped into sacks. In the Australian shearing shed the removal of the fleece from the sheep is the beginning of its preparation for the market.

In shearing, the bellies of the fleeces are removed first and do not again come into contact with the fleeces, but are baled and sold separately as bellies. Convenient to the shearing floor a well-lighted room is provided for skirting, rolling, classing, baling the fleeces, and recording the contents of each bale.

The work of the wool room is superintended by the classer, who directs the work of the [illegible]llers, and piece pickers and assigns each fle

class so made is baled separately and the bale marked accordingly. In the auction sales and the wool-selling centers each separate lot offered comprises only those bales bearing the same mark from a single clip.

The number of men and boys required to carry the fleeces to the tables in the wool room, sweep floor, skirt, roll, and bale is about equal to the number of actual shearers. Boys carry one fleece at a time to the wool room and throw it, spread out, upon the slatted-topped wool table. It is then skirted, two men working on opposite sides of the table.

Skirting consists in removing the coarser, dirtier, and inferior wool from the lower parts. The amount of wool going into the skirtings is determined for each lot of sheep by the classer, and may vary between different clips or between different lots of sheep belonging to the same station. The classer is a man of experience and familiar with the wants of the mill buyers. He is usually left to prepare the clip as he thinks necessary to insure maximum returns without suggestion or influence from his employer. (Pl. XXV, fig. 2.)

After the skirtings have been removed, the body of the fleece is neatly rolled, flesh side out, in such a way that when it is later removed from the bale and placed before the sorter at the mill it is readily spread out in its original shape. After rolling, each fleece is passed to the table at which the classer does his particular work. Behind the classer are a number of bins, one for each class or grade. Each fleece is assigned to its particular bin on the basis of length of staple, fineness, amount of yolk, amount of sand or other foreign matter, soundness, brightness, or color. The men operating the baler mark each bale according to the class name assigned by the classer at the beginning of the shearing to the bin from which that particular bale was filled. (Pl. XXVI, fig. 1.)

The skirtings, which comprise the inferior part of the fleece, are not allowed to go into the trade as such. They are divided into separate lots and the extra value obtained by sorting over the skirtings is considered to equal fully the expenses of the wool room. In most cases the skirtings are taken to the tables of the piece pickers, who separate them into tags, stained pieces, locks, first and second pieces, or broken fleeces. The number of lots prepared from the skirtings varies greatly according to the ideas of the classer. It

is aimed to divide the skirtings into lots not so much upon the basis of fineness or spinning counts as according to percentage of clean wool contained.

A primary object all through the classer's work is to group together fleeces having a similar percentage of clean wool, and after that to secure as much as possible of uniformity in respect to spinning quality and character. The percentage of clean wool obtainable from any offering of wool is the most important factor in determining price and allowing accurate valuation, the buyer wishing first of all to be assured that 10 or 100 bales of a certain lot in one clip will be the same as the sample bales selected at random from that lot for his examination. Uniformity of the lots in regard to fineness and other qualities is also necessary, but can not be considered before the securing of uniformity in respect to the percentage of clean wool.

Division of a clip into too many lots is objectionable, as large lots sell better than smaller ones. The number of lots or classes must be determined in accordance with the size and breeding of the flock and the condition of the flock. It is considered safer to err in making too few classes rather than too many, so long as the mixing of fleeces varying in respect to shrinkage is avoided.

In one New South Wales shed visited, where 10,000 two-year-old Merino wethers were being shorn, the classer was making 11 different lots of wools, according to the following names and descriptions:

1. AAA combing. This lot contained only the finer, best fleeces, having good length, sound, bright, and light shrinking.
2. AA combing. Similar to AAA combing, but heavier in tips, and would shrink more on that account.
3. AA. Similar to AA combing, but shorter.
4. A. Short stapled and heavy in yolk.
5. AA fleece. Rougher and coarser than AA combing.
6. A fleece. Short, discolored.
7. Broken fleeces. Best parts of neck and breech wool from skirtings.
8. First pieces. Best and cleanest of skirtings that remain after separation of that going into broken fleeces.
9. Pieces. Sometimes called second pieces; dirtier and inferior to first pieces.
10. Locks. Second cuts and sweaty locks from below the wool table.
11. Bellies.

Different classers may apply different names to similar lots of wool. Since uniformity throughout each lot is the

FIG. 1.—A GROUP OF MERINO RAMS FROM ONE FLOCK SOLD BY AUCTION AT SYDNEY IN JULY, 1914, AT AN AVERAGE OF $1,770, THE RAM ON THE RIGHT BRINGING $5,000.

FIG. 2.—WOOL ROOM OF A NEW SOUTH WALES SHEARING SHED.

FIG. 1.—BALING ROOM IN AN AUSTRALIAN SHEARING SHED.

[An end of the classer's table shows in the space between the wool bins at the left.]

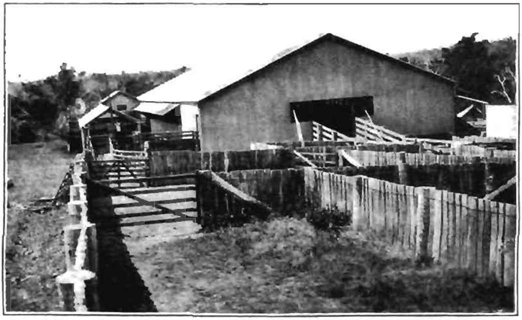


FIG. 2.—A QUEENSLAND SHEARING SHED THAT TURNS OUT ONE OF THE HIGHEST SELLING CLIPS IN THAT STATE.

first essential, a lack of agreement as to use of names is not a serious matter, especially when it is considered that sample bales of each lot are always examined by the prospective purchasers.

In another New South Wales station the 1913 clip was classed into the following lots, for each of which the number of bales and price received is shown:

Lot.	Number of bales.	Price equal to—	Lot.	Number of bales.	Price equal to—
		Cents.			*Cents.*
A combing, ewes	17	21.5	Broken fleece, ewe hoggets	5	21
A combing, ewe hoggets	4	22	Broken fleece, rams	2	20
A combing, rams	3	20	A pieces, ewes	20	20
AA combing, ewes	29	20	A piece, ewe hoggets	9	17
AA combing, ewe hoggets	5	18	A piece, rams	4	14.5
AA combing, rams	1	16	Bellies, ewes	7	13
A fleece, ewes, bright, long, tender	8	18	Bellies, ewe hoggets	2	13
A fleece, ewe hoggets	3	18	Bellies, rams	1	11
Combing	4	20	Stained pieces	1	8
Fleece, ewes, short, heavy, yellow	6	17	Locks, ewes	6	6
Fleece, ewe hoggets	4	17	Locks, ewe hoggets	2	6
Fleece, rams	2	16.5	Locks, rams	1	5
Broken fleece, ewes	21	18.5	A lambs	1	19
			AA lambs	5	11.5
			AAA lambs	6	7

In the above clip there was an extra number of bales of broken fleece because of an unusual amount of burs in the ewe paddocks that season. This lot, consisting largely of necks, shrinks lightly and contains some good wool, as the price shows. It requires special handling, and the buyer who secured the bodies of the fleeces would probably have been unable to bid on them at all had the burry parts not been separated.

ACTUAL RESULT OF LACK OF SYSTEM IN PREPARATION OF AMERICAN-GROWN WOOLS.

The most that any American wool grower attempts in the preparation of his clip for market is the separate sacking of black fleeces and of fleeces from ewes, wethers, lambs, and rams. A few separate some of the larger tag locks. A canvass made by the Animal Husbandry Division elicited 383 replies summarized in the table below. Since persons in a

position to give an affirmative answer to the questions were most likely to reply, the percentages shown are undoubtedly above what would be found correct for the area canvassed as a whole.

Western methods in putting up wool for market.

State.	Number of sheep shorn in 1913 by persons reporting.	Number of persons reporting.	Number who sacked ewe, lamb, and buck wool separately.	Number who sacked blacks separately.	Number who used paper twine.	Number who sacked tags separately.
Arizona	131,422	18	9	6	2	9
California	125,302	26	10	5	8	4
Colorado	109,695	13	6	8	8	3
Idaho	336,249	62	32	48	49	45
Montana	518,049	82	46	28	44	51
New Mexico	92,011	13	6	10	3	5
Oregon	195,246	37	25	23	34	26
Utah	309,583	71	17	58	61	24
Washington	77,419	13	7	....	11	3
Wyoming	371,029	48	32	40	39	33
Total	2,269,005	383	190	226	259	203
Per cent of total	....	....	49.3	59	67.6	53

An American manufacturer has stated that because of their poor preparation American wools bring less per pound than imported wools of similar character. He substantiates this statement by showing the results of sorting and scouring two lots of wool, one grown in Idaho, the other imported. What remained of the Idaho wool after sorting and scouring was considered fully equal to the clean imported wool and was mixed with the imported lot for manufacturing.

	Idaho wool.	Australian wool.
Idaho Soda Springs, cost in grease....cents..	18¼	28
Loss in weight....per cent..	1.96	.87
Strings, clips, low, etc....do....	8.88	....
Shorts....do....	2.5	.17
Main sorts....do....	86.66	98.96
Actual cost main sorts in grease....cents..	20.06	28.29
Yield of main sorts from total weight of wool purchased..per cent..	42.07	62.64
Shrinkage of net weight of wool scoured, main sorts....do....	51.46	36.70
Cost per clean pound....cents..	41.32	44.69

It should be remembered that the Idaho wool had been graded by the dealer before it reached the mill. The fleeces had been separated into various lots according to fineness, condition, and appearance, and the lot reported in the above test contained only similar fleeces and could therefore be more accurately valued than would have been possible in the original bags. Even so, the manufacturer bought 11.37 per cent of material which had to be resold at a lower rate, adding 1.56 cents per pound to the grease cost of the Idaho lot, against 0.29 cent in the case of the Australian wool. The main lots of the Idaho and Australian wools lost in scouring 51.46 per cent and 36.7 per cent, respectively, and the returns of scoured wool of the class sought were 42.07 per cent and 62.64 per cent, respectively.

Because of extra labor expended upon wool at the mill, which in the case of the Australian lot had been done by the producer, and to safeguard against uncertainty of the value of the 11.38 per cent off sorts, American wools have to be bought at a lower price. In this case it was 3.37 cents per clean pound below its actual value. Naturally and properly the dealer had to reckon upon this discrimination in buying the ungraded clip. In an average western clip one sack might contain some fleeces that would yield 15 per cent less clean wool than others, or it might contain fleeces that while shrinking alike would differ in actual grease value by as much as 5 cents per pound.

The expression of another manufacturer shows how the American woolgrower suffers as a result of the condition in which his wool goes into the trade.

I think those of us who are established here in America, whose consumption of American wool has been a very large part of their total consumption, have grown *to gradually recognize these deficiencies in the putting up of* American wool as compared to the methods of putting up foreign wool to be a fixed charge on the wool, and consequently, in the consideration of its purchase, have realized that you have about doubled the working charges, that you have what might be called costs from wools in the bag to wools in matching prior to scouring, and you figure according to the price as to what we might say is the raw state in the foreign wool.

ADOPTION OF THE AUSTRALIAN SYSTEM IN PREPARING AMERICAN CLIPS FOR MARKET.

There is no one to deny the great necessity for improvement in putting up American wools. The value thereby added to the clip would give greater stability to our sheep industry and insure larger and steadier supplies of mutton as well as of wool. That the Australian method of putting up and selling wool is ideal from the standpoint of the grower can not be questioned.

The practicability of our growers emulating those in Australia in handling the fleeces at shearing time is debatable. Undoubtedly the work of skirting, piece picking, and classing can be done most efficiently at the time of shearing. Whether it can be done as cheaply at the shearing shed as in the dealer's warehouse or in the mill is a secondary question. If the extra price received by the grower for a properly skirted and classified clip offsets the expense of the work no other considerations apply. The Australian woolgrower does not admit any doubt of the economy of handling his wool in such a way as to maintain the popularity it enjoys in all wool-importing countries; but an Australian never sells at so much per pound for an entire clip. Each bale of from 300 to 400 pounds may be sold separately. When the sample bales from the different lots comprising his clip are displayed in rooms of the selling agents, there are ordinarily from 50 to over 100 buyers, representing several countries, ready to examine it and bid in the auction that follows.

The present course by which American wools reach the grower could not readily or easily be altered to secure a manufacturer's appraisal of the small lots that could not be avoided in even a broad classification of our clips. From the grower's standpoint the best plan in sight would seem to be to prepare the clips on lines similar to those followed in Australia and allow selling agents to group together lots of similar wools from various clips to make up sufficiently large offerings to interest the buyers in the trade who prefer to buy in lots of 50,000 pounds and upward. As time goes on the advantage of being able to secure the better prepared wools might render buying representatives more willing to

buy in smaller lots in order to insure the continuation of the improvement.

Present-day American shearing sheds do not provide facilities for skirting and classing the fleeces. A well-lighted room convenient to the shearing board is the essential addition needed. The Australian style of shearing shed with its facilities for penning the unshorn sheep and discharging the shorn ones is desirable and will ultimately come into use, but the conditions prior to the work of handling the shorn fleeces are not the essentials of the system. That there is need of improvement in the shearing itself is shown by the difference in percentage of "shorts" in Idaho and Australian wools previously compared. (Pl. XXVI, fig. 2.)

Men experienced in classing wool and directing the work of skirting, rolling, and piece picking are not available in the United States. Such men can be obtained from other countries at rates of compensation that would justify their employment in training other classers and the hands required to do the work of the wool room at the shearing shed. Economy in the employment of these men through whose hands the wool passes after being shorn, as well as economy in providing the necessary building and in the shearing itself, would call for having around 30,000 sheep shorn at each shed. (See fig. 19.)

COOPERATIVE SHEARING SHEDS.

In New Zealand it is a common thing for three or four men to cooperate in the erection and running of a conveniently located shearing shed. Each holds stock in proportion to the number of sheep he keeps. Before shearing commences the stockholders meet and appoint a superintendent of the shed. The superintendent engages the classer, the shearers, and all necessary help, keeps the accounts, and divides the total expense among the users of the shed in proportion to the number of sheep shorn for each. Each clip is delivered to its owner properly classed into lots ready for shipment to any of the selling houses.

Australian authorities state the cost of "getting wool up in a scientific manner" (after its removal from the sheep) to be around one-quarter of a cent per pound when done for

large numbers and by experienced men. If American wool-growers can receive actual value for each lot in a well-classed clip of wool, an added expense of one-half cent per pound for improvement in preparation would be justified.

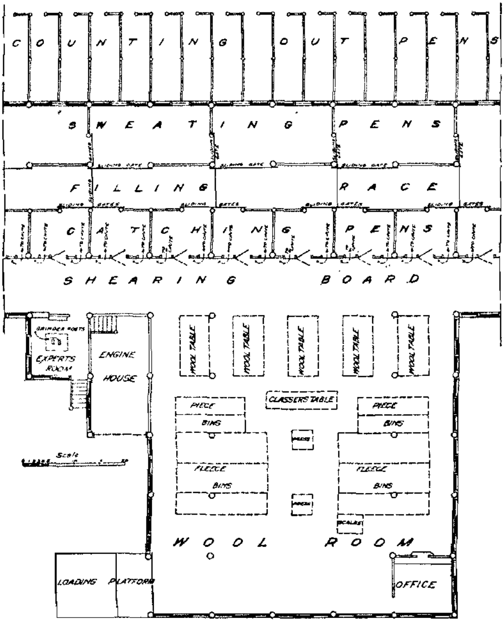


FIG. 19.—Plan of wool room and section of shearing board of an Australian shearing shed. The sweating pens, filling race, and catching pens are built sufficiently high from the ground to permit shorn sheep discharged through the chutes to pass underneath to the counting pens, which are outside the building.

SHEEP FARMING IN NEW ZEALAND.

So far as attention to breeding, flock management, and preparation of wool are concerned, there are no important distinctions between the flockmasters in Australia and those in New Zealand. An American studying New Zealand

sheep husbandry is chiefly impressed with the fact that our Middle and Eastern States farmers have not begun to realize the possibilities and advantages of keeping sheep on high-priced land.

The total area of occupied land in New Zealand is under 45,000,000 acres. Of this, 5,000,000 acres have been plowed and sown to artificial grasses for grazing, while over 9,000,000 acres have been surface sown to artificial grasses without plowing. The first-mentioned lands support from 1 to 8 sheep per acre for the year, while the latter carry from one-half to 2 sheep per acre. Grass is the principal crop. With a growing season of 10 months and a well-distributed rainfall it is found profitable to keep in grass, for stock alone, lands valued as high as $150 per acre. Nearly one-half the occupied land is in holdings of over 5,000 acres, mainly used for sheep, there being 90 holdings of over 50,000 acres each against 18,694 holdings of from 50 to 200 acres.

The number of sheep kept has advanced from about 19,000,000 in 1896 to 24,595,405 in April, 1914. The enumeration for April corresponds to November in the United States, coming after a large proportion of lambs have been marketed and corresponding quite closely to the numbers of the shearing season to follow. Wethers, rams, and ewes under breeding age comprise about one-half of the sheep. The number of sheep slaughtered for food purposes for 12 months ending March 31, 1914, was 4,019,831 and of lambs 4,338,181.

New Zealand's flocks number 21,527, and the average size of flock has increased from 1,081 in 1896 to 1,124 in 1913. About one-half the sheep are in flocks numbering less than 2,500 head, and seven-eighths of them are owned in flocks numbering over 500 head each.

A contrast of these figures with others for the leading farm-sheep State and the leading range-sheep State in this country is of interest:

State.	Total land area.	Number of sheep in State.[1]	Number of holdings over 100 acres.[2]	Number of holdings having sheep.	Average size of flock.
New Zealand	60,292,232	24,595,405	35,702	21,527	1,124
Ohio	26,073,600	3,263,000	94,754	71,556	45
Wyoming	62,459,160	4,472,000	9,584	1,643	2,938

[1] January 1, 1914. [2] In 1910.

It is partly because of necessity that New Zealand lands are so largely devoted to sheep raising. A good quality of mutton and of wool can be produced without the feeding of grain, the production of which is not favored either by the soil or by labor conditions. On the other hand, the place occupied by sheep is evidence of the profits obtainable when valuable lands are devoted to well-managed flocks of sufficient size to insure for them the lively interest and careful tending essential to their well-being and which in our farming States is the exception rather than the rule.

It is true that New Zealand flockmasters have no predatory wild animals to contend with. The problem of the domestic dog is not absent, but is held in check because of the general and predominating interest giving support to well-enforced laws. While it is true that the values of other commodities do not call for other uses of land, as in our farming States, this fact is offset by the lower prices paid for mutton and lamb in New Zealand. The advantage enjoyed there in the price of wool is quite largely due to the exercise of superior skill in getting the clips upon the market.

Our farming States have experienced a decline in sheep raising on account of unequal competition from cheap western lands. The force of that competition no longer exists, and the agriculture of the Middle and Eastern States will not again exhibit its most profitable status until flocks of sheep are larger and much more numerous than at present. There are difficulties in the way, but the main one is the lack of appreciation and examples of results obtainable from carefully tended flocks. The prosperity of New Zealand farmers and the improvement in their farms abundantly attest the practicability of devoting valuable lands to intensive sheep husbandry.

PROBABLE EXTENT OF FUTURE IMPORTATIONS OF MUTTON AND WOOL FROM AUSTRALIA.

In the minds of many American farmers there exists an uncertainty regarding the influence upon the future course of prices of importations of mutton and wool. Australia and New Zealand are regarded as likely to increase greatly their production to supply our markets and thus to depress the price of the home-grown products.

Those countries can and doubtless will increase their production to a considerable extent. Such an increase can not be a sudden one, and it is doubtful if an additional output can be produced at a lower cost than is possible by the use of the best methods in the United States. None of the land now unoccupied in New Zealand is capable of producing really high-class mutton or wool. An increase in the number of sheep in that country is to be looked for chiefly through more seeding of natural pastures and the cultivation of forage crops on present natural or artificial grass areas. With the cost of labor ruling in that country and the comparatively slow rate of increase in population, the advance toward any system requiring an increase of labor is likely to be gradual.

In Australia there is a great deal of territory available for new flocks. Much of it is subject to rather frequent droughts, while labor conditions and restricted construction of railroads render improbable any rapid development. Much of this newer country requires around 3 acres to support a sheep. Those competent to judge state that the present rate of increase in the number of sheep in the interior no more than balances the loss in moister coastal areas that have supported 3 sheep per acre and which are now being used more largely for dairying.

Even with favorable seasons and aggressive development in Australia it is improbable that the proportion of the increase reaching the United States would seriously affect our market values. The United States is now one of the small importers of Australasian meats. It may be desirable for shipping companies to divert larger supplies to our ports to furnish eastbound cargo for vessels carrying back American manufactures. With an even greater meat shortage in the other countries receiving Australasian meats than exists here, prices are not likely to divert large amounts from European destinations into our markets.

The United States has for some time been a buyer of the better Australian wools. With no barrier against importing any or all classes of wools an increase of such imports might be expected. To secure such, however, American buyers must compete in Australia and New Zealand with buyers from several other nations, and supplies indicated from wool-

exporting countries in the next few years rather strengthen the position of the producer.

The chief concern of the American farmer and ranchman from now on should be to work steadily along definitely worked out plans of breeding and flock management, and to adopt modern and economical methods of preparing his wool for market.

SELECTION OF HOUSEHOLD EQUIPMENT.

By Helen W. Atwater,
Assistant in Nutrition, Office of Experiment Stations.

WHEN one considers the variety of things which must be put into a house to furnish it even simply, the question of household equipment appears a complicated one. The variety is necessary because a house serves many different purposes. Considered merely in its material aspect, it is the place where the family eat and sleep and take their ease, and it is also a workshop in which a great many different things are made, and each of these purposes must be recognized in furnishing it.

Considered as a workshop, it is sometimes a bakery, sometimes a clothing factory, sometimes a cleaning establishment, and so on. The list of tasks which are performed in the household is by no means as long as it was in the days when cloth was spun and candles made at home, and almost every decade sees more work removed from the home to the commercial factory. Nevertheless, a great many tasks still remain and are likely to remain in the home, for which provision must be made in furnishing it.

In equipping her home the housekeeper should be guided by the same principles that would be followed in the selection of equipment for any other workshop, and should choose furnishings and tools which will make it possible for her to carry on her various household tasks with the least waste of time, work, and materials. In other words, a house should be equipped for efficiency in carrying on housework just as carefully as a modern shoe factory is equipped for making shoes. In such a factory lighting, heating, ventilation, sanitation, etc., are as carefully considered as the machinery, and these matters of hygiene are even more important in the home, which is not merely a workshop, but also a place in which to rest and recuperate. Since a home is even more than that, and serves also as the material setting for the life of the family, other points must be considered which have

little or nothing to do with efficiency in a factory. It is certainly as important in a home to provide for comfort and wholesome enjoyment as for cooking and cleaning, eating and sleeping.

PLANNING BEFORE BUYING.

Sometimes when a woman takes up the problem of house furnishing she has to buy everything new from the beginning, and sometimes she already has a more or less complete equipment which she hopes to improve gradually, that is (to continue the comparison with the factory), she has to do with a "going concern." In either case she must study the situation carefully and make sure of what she most wants before she begins to buy. It is impossible for her to select to the best advantage unless she has all the principal needs in mind to begin with and goes at the task systematically. Haphazard buying is always extravagant and nowhere more so than in connection with house furnishings. There is such a bewildering variety of things to be used in a house that, unless the housekeeper keeps a clear idea of what she wishes most and plans her buying carefully, she will find herself getting things which, though useful, are not the most useful, or are not the best adapted to her particular needs. Two dining tables may be equally good of their kind, but one may be much better adapted to a particular house and family than the other. If it is a case of furnishing a house entirely with new things, it is wise to go slowly and learn from experience what will best suit the special conditions, even if this prevents putting the whole house completely in order at once. For example, it might be well to see how one's belongings fit into the built-in cupboards before deciding whether to buy a sideboard or a china closet. If only a limited amount of money can be spent at one time, it would probably be better to leave an extra bedroom unfurnished or do without an extra rug than to "skimp" on the quality of the necessary things. When it is merely a question of renewing or increasing old equipment, the thoughtful housekeeper considers the value of each article in connection with what she has or expects to have as well as by itself. If she has no convenient cupboard for her ironing supplies, an ironing table of the settle type with a box under the seat may be more serviceable than the ordinary kind; and if she expects to get a new

set of table dishes soon and can then use some of the old ones in the kitchen, it is poor policy to stock up unnecessarily with kitchen ware.

In order to buy in accordance with a definite plan she must often steel herself against the allurements of bargain counters or of beguiling salesmen, not because the wares they offer are not intrinsically good or cheap, but because in spite of being good or cheap they may not be what she really needs most. It is poor economy for her to buy sheets which will not be used for several years instead of napkins which are needed at once, simply because the sheets happen to be a few cents cheaper than usual, or to be persuaded to take an omelet pan when what she had meant to get next was a new coffee pot.

CHOOSING FOR NECESSITY, CONVENIENCE, AND PLEASURE.

In equipping any workshop, whether it be a factory, a dairy, or a house, the two chief elements which govern choice are necessity and convenience. Very often one article answers both these demands, and if possible those should be chosen which not only fill a need but fill it in a way which is economical of labor and material. For example, a kitchen stove is usually considered a necessity, not a convenience, but in selecting it a model which is convenient to work at and to care for is what a good housekeeper looks for. In choosing labor-saving devices it is a good rule to give the preference to those which save heavy work and which lighten tasks most frequently performed. A machine for washing clothes saves more bodily energy than a patent roasting pan, and a meat chopper is used more often than a device for stoning cherries.

The third element of choice in the case of many articles of household equipment is that of pleasure or beauty. As has already been pointed out, this marks the difference between furnishing the house and furnishing other workshops. Whereas the output of a factory consists of the particular line of goods which it makes, and the output of a dairy, of milk, butter, and cheese, the output of a home includes not only such material things as food and clothing and even general comfort, but also such immaterial things as the mental, moral, and spiritual welfare of its occupants. We some-

times assume that these less material factors of home life are independent of the furniture and equipment of the house and can be trusted to take care of themselves if they are not actually discouraged. But if a family really wishes its home to be more than a place to eat and sleep in, it ought to plan as deliberately for increasing the production of comfortable and profitable leisure, pleasant social intercourse, and an intelligent interest in things outside of its material needs as for mere food, clothing, and shelter. Fortunately, this does not always mean buying more costly furniture and more elaborate equipment, but rather choosing things which not only are necessary and convenient, but which at the same time give pleasure. Since we must have dishes to eat from, we might as well have them in attractive shapes and patterns and color, especially as good-looking ones do not necessarily cost more than others. The more any article that is used in the home includes all three elements of necessity, convenience, and beauty, the more efficiently will it serve its purpose.

FITTING EQUIPMENT TO PARTICULAR CONDITIONS.

It is impossible to lay down hard and fast rules as to exactly what articles or materials are best for use in the household, because conditions vary so greatly. No two homes are exactly alike as regards house and occupants and income, and what is suitable and economical in one may be inconvenient and extravagant in another. In a new house stained and varnished woodwork may be easiest to take care of, but when the woodwork is old and worn paint may make a more satisfactory finish; in fact, if the wood has already been painted, it may be difficult to use any other finish. It would be as poor economy for a family in easy circumstances to hesitate at the price of such household improvements as a screened porch or a good kitchen floor as it would be for people who can hardly pay for keeping their everyday necessary equipment in proper condition to buy a charcoal broiler for steaks and chops or a collection of expensive brushes intended for cleaning special kinds of furniture.

The housekeeper must plan her household equipment with reference to the amount of labor there will be to run it. If she is to do everything herself she must not only arrange

her work and her implements so as to avoid all unnecessary work, but she must also avoid many other things, such as bric-à-brac which is difficult to dust, polished surfaces which have to be frequently rubbed, and elaborate linen which it takes much time and skill to launder. On the other hand, if she does the work herself, she may be justified in buying things of better quality than if they were to be used by a careless helper.

The question of space must also be considered. In a large house with plenty of storage room one can perhaps afford to have special equipment for this, that, or the other kind of work, but where space is strictly limited one must concentrate. For example, one must choose one's pots and pans so that each will serve several purposes, and arrange the closets and cupboards so that all the space in them will be used to the best advantage. It is questionable whether unnecessary utensils and scattered, half-filled closets are ever worth the extra work they occasion, but where space is limited it is certainly poor economy to keep superfluous things about.

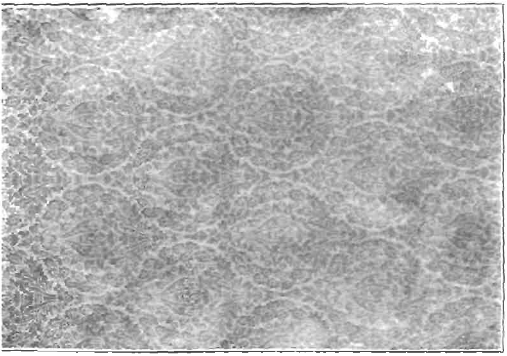
WHAT MAKES A WELL-FURNISHED HOUSE.

The well-furnished house is not one which is cluttered up with things which may be useful or attractive in themselves, but which nobody uses or enjoys, but one which contains those things which are necessary for convenience in working and for comfort and satisfaction in living, and no more. It need not on that account be strictly utilitarian; on the contrary, if it were well planned, perfectly convenient, and perfectly comfortable, it would also be beautiful, because beauty does not lie so much in the ornaments which are put on a thing as in the perfect adaptation of that thing to the use for which it is intended. In a collection of historical furniture the most beautiful pieces of each period are not those which are most elaborately decorated, but those in which material and shape and workmanship best answer the needs they were designed to meet. If there is ornament, it does not interfere with usefulness or comfort, and is so applied that it brings out the inherent beauty of the lines and material. The reason why some of the plain old tables and chairs which we have inherited from earlier times look better than

many of the elaborate and showy ones which have just left the factory is that their makers were more interested to make them strong and comfortable than simply to produce novelties the chief merit of which is to catch the eye. The same principle holds in all household furnishings—in fact, in everything. If a woman tries sincerely to arrange her house according to this idea of adaptation to use, she need not worry about its being "pretty." She may not be rich enough to have expensive things, but if she uses harmonious colors for her walls, floors, and upholstery, and chooses furniture for its good design and comfort rather than for its ornamentation, her house can hardly fail to be restful and attractive.

It sometimes seems difficult for a person who can not patronize expensive shops to find furniture with strong and yet graceful lines, wall papers and upholstery materials in simple designs and good, soft colors, or china and glass with plain but good shapes and decorations. Nevertheless, they do come in inexpensive grades, and the more people demand them the more dealers will carry them. Undoubtedly it is easier to take what is offered and to be satisfied with the assurance that "it is positively the latest," even when one's own better judgment says that it is neither suitable nor beautiful. If women would insist on getting what they want instead of what the dealer may want to sell, their houses would be better furnished, and they would do much toward improving public taste.

It is possible to carry the idea of simplicity too far. For example, a chair is not necessarily beautiful, comfortable, or easy to take care of merely because it is made up of straight lines. On the contrary, such severely plain furniture is often both awkward looking and uncomfortable. Too many useless ornaments in a room undoubtedly give it an overcrowded, restless look, and have a further disadvantage in making unnecessary work in cleaning. On the other hand, no ornaments at all would make it seem bare and unfriendly. The sensible woman steers between the two extremes and uses a few ornaments, chosen because they are useful things in especially beautiful form, or because they represent the artistic interests of the family, or have the intangible but none the less real value of personal association. A usable vase of handsome glass or

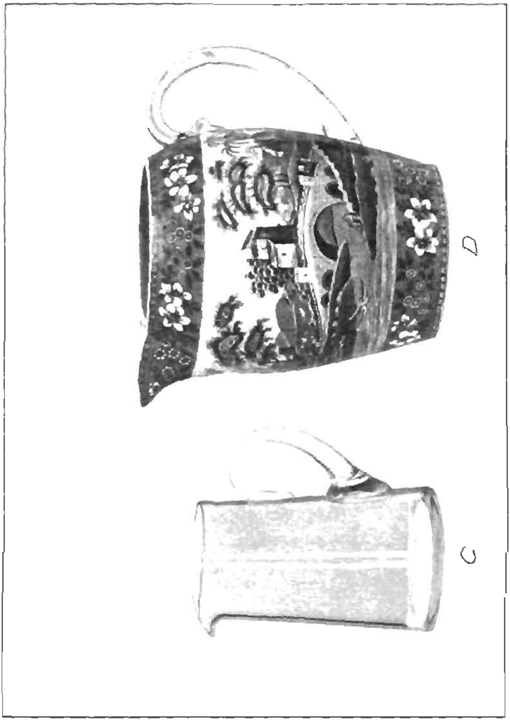


A. A Good Design of Wall Paper in Two Tones of the Same Color and with the Figure nearly Covering the Background.

B. A Striking Design, Good of Its Kind and Suitable for Certain Types of Large, Specially Furnished Rooms, but Out of Place in an Ordinary Private House.

A. INEXPENSIVE PLATE WITH GOOD TYPE OF DECORATION IN SIMPLE BAND OF COLOR SET OFF BY GILT LINES.

B. TEAPOT INCONVENIENT TO CLEAN. NOTE SMALL OPENING AT TOP AND IRREGULARITIES ON HANDLE WHICH TEND TO COLLECT AND HOLD DIRT.



C. GLASS PITCHER. PLAIN BUT GOOD IN SHAPE AND EASY TO CLEAN.

D. OLD BLUE AND WHITE PITCHER. GOOD IN SHAPE AND DESIGN AND EASY TO CLEAN.

FIG. 1.—WORK TABLE OF CORRECT HEIGHT, ALLOWING WORKER TO STAND IN EASY, NATURAL POSITION.

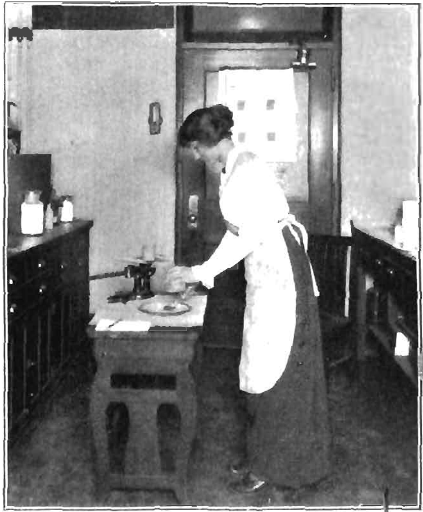


FIG. 2.—TABLE TOO LOW, REQUIRING WORKER TO STAND IN BENT, UNCOMFORTABLE POSITION.

pottery, a good-looking box for matches, a graceful lamp with a shade which not only throws a good light but is beautiful in shape, color, and design by day as well as by night, a candlestick which is a family heirloom, and a few good photographs or prints of famous places or pictures in which the family is interested are examples of ornaments which are suitable, because there is some reason for using them.

ECONOMY IN COST AND CARE.

When it comes to the point of deciding between several forms of the same article, price is perhaps the first thing the majority of us must consider. So far as possible, the housekeeper should have a definite idea of how much she ought to pay for each part of her equipment and not let her choice run much above or below that. It is not true economy to pay more than one can afford for a thing, no matter how useful or how desirable it may be. On the other hand, the cheapest is not always the most economical. Other factors besides price enter into consideration, foremost among them being suitability and durability or wearing quality. It is evident that if dish-toweling at 18 cents a yard wears twice as long as that at 12 cents, the more expensive is cheaper in the end. Very often the wearing quality influences not only the price but also the convenience of an article. In the case of wall paper, curtains, furniture coverings, and other things on which considerable labor must be spent before they go into use, it is a satisfaction to have them durable, so that the full value of the work as well as of the materials may be obtained. Moreover, after one has put care and thought into the selection of such furnishings and they prove successful in use, it is discouraging to have them wear out quickly and leave the whole task to be done over again. Some families get tired of their belongings so soon that they prefer them not to be very durable, and argue that two cheap things give more pleasure than one expensive one. This is evidently a question of taste, but it is worth noting in this connection that in household furnishings styles change much less rapidly in articles of good quality than in the cheaper grades, and that among people of cultivated taste whose means allow them to choose what they like, furnishings are kept in use for many years and are

admired not for their novelty or fashion but for their intrinsic beauty. Moreover, in such things as furniture, upholstery materials, linens, etc., durability and beauty frequently go together, because both depend upon good quality in the materials and workmanship, and if one gets good-looking things, they often turn out to be durable. The size and circumstances of a family sometimes change faster than its good furniture wears out, and unless this possibility is borne in mind when the furniture is bought, the family may find itself stocked with things which still have a great deal of wear in them but are not suited to existing circumstances.

Another important element in the choice of furnishings is the amount of labor required to care for them and keep them in good condition. There is a greater range of choice here than many women realize, and it is a question which is worth more consideration than is often given to it. Rough surfaces like those on cheap earthenware, and worn, rough, and unpainted wood catch and hold dirt and are much harder to clean than smooth ones. Carving on furniture, elaborate castings on stoves, elaborate metal fixtures, fancy-shaped handles on dishes, etc., are things which make cleaning unnecessarily difficult. Polished metal usually takes much rubbing to keep it in condition, and for this reason dull finishes are often preferred on door handles, etc. Sharp angles in moldings also collect dirt and are hard to clean. Rounded moldings where the wall and floor meet have been introduced in hospitals and might well be imitated in private houses, as they make it much easier to remove dirt.

GENERAL AND PERMANENT EQUIPMENT.

The articles which go to furnish a house are so many and so various that it is impossible to enumerate them in a brief article or even to mention all of the more important groups. All that can be done is to discuss some of the latter in a general way which will show how to apply the principles of choice which have already been described.

Some of the articles of household equipment are installed permanently, and some of them are changeable. Many of the permanent ones are built in when the house is constructed and come within the province of the builders. Nevertheless, the woman for whom the house is being built, or who is

choosing one already built, has a right to pass judgment on them, since it is she who uses them and keeps them in order.

If the house is provided with a water and drainage system she should try to get fixtures which are convenient to use and easy to care for. Open plumbing is now generally accepted as more sanitary than inclosed and is not harder to take care of, particularly if the pipes are smooth, symmetrically arranged, and so placed that they are easy to get at. Porcelain-lined fixtures are in common use in kitchens and bathrooms now, and if the interior surface is smooth and unbroken, they are easy to clean, but if the enamel has rough spots in it these will hold the dirt most obstinately. If possible, the kitchen sink, washtubs, bathtub, closet, and washbasin should be so placed that it is easy to clean around and behind them.

There is a considerable choice of material for kitchen sinks, each having its disadvantages and advantages. For example, the porcelain sinks show at once whether they are really clean or not and can be kept tidy easily, provided they are smooth, but they are rather expensive; enamel is easy to clean and not expensive but chips easily; soapstone is durable, but difficult to clean; iron is also durable and is not especially hard to clean, but it does not show dirt and so invites carelessness. Whatever material is chosen, the sink should be placed where the light is good and should be set at the height most convenient for working. This question of height applies also to worktables, washtubs, etc., and will be discussed later.

If a house has neither plumbing nor a drainage system, it should at least have a kitchen sink of good size and height and, if possible, made of material which can be kept clean easily. A suitable pipe should be provided for carrying away waste water, either to a bucket from which it may be emptied or to a drain outside. The latter must be constructed so that it will be sanitary and should not be merely an open trench, which is not only disagreeable but which often becomes dangerous to health.

If the house is to be heated by stoves, plain substantial ones should be selected. It is difficult to see why garlands of leaves and flowers in polished metal or bronze dogs should ever be considered appropriate decorations for stoves, yet

such designs have often been chosen in preference to models which owe their good looks to good proportions and construction. Not only can the latter be more easily kept clean, but they are more in accord with the requirements of good taste than those which are awkward in shape or laden with useless ornaments, so-called..

If the house is heated with steam or hot water, radiators should be selected which are of suitable size and shape and which have plain surfaces without raised designs to catch and hold dirt. Since their main purpose is to heat the room, their size and location depend chiefly on this, but as far as possible they should be arranged so that they will not interfere with the placing of furniture in the room and so that it will be easy to clean around and behind them.

Whatever means of lighting is used—oil, gas, or electricity—simple lamps or fixtures are usually preferable, because they are easier to keep clean than fancy ones, and, if they are made of good materials and good designs, are better looking than very elaborate ones. Light is often used more economically if there are several fixtures in different parts of a room, and if these are planned for in the beginning they can be obtained with little extra expense. In the room where the family sit to read and sew a good lamp or a drop-light on the table or fairly low side lights on the wall are better for the eyes than high central lights. A good light should be provided in the kitchen, especially in the places where the work is chiefly done, such as over the sink and the work table.

Screens for windows and doors are sometimes considered part of the permanent and sometimes part of the changeable equipment of a house, but in any case the house should be well supplied with them, not so much because flies and mosquitoes are disagreeable as because they actually carry disease and are very dangerous pests. The screens which are made to fit the individual windows and do not need to be removed each time the latter are opened are undoubtedly the most convenient, but if they are too expensive, cheaper kinds can be used satisfactorily. If the ready-made adjustable ones are chosen care must be taken to have them fit tightly. If there are any cracks, flies and mosquitoes will find their way in but not out. Door screens should be provided with springs so that they will be sure to close tightly.

Bronze wire mesh which will not rust is perhaps the most durable material for screens. Cheaper wire carefully painted lasts fairly well, and cotton netting is equally efficient as long as it is whole. It is better to have a house thoroughly screened with netting than badly screened with wire, but the netting will have to be carefully watched and frequently renewed to keep it fly proof.

In cold climates double windows are often used in winter, and soon pay for themselves by the saving in coal.

Built-in closets or cupboards are other features of permanent equipment which are most important to the housekeeper. If she has anything to do with planning her house, she should try to locate them where it takes the least possible number of steps to get at or put away their contents. A small closet, provided with shelves and drawers especially adapted to the things kept there, is more satisfactory than a larger closet poorly arranged. In planning drawers it is well to remember that a larger number of shallow ones are usually preferable to a few deep ones, because all of the space in them can be used without piling things on top of each other. Similarly, narrow shelves, preferably not more than a foot wide, are usually more convenient than wider ones and are easier to keep clean. Many housekeepers prefer the movable kitchen cabinets to built-in cupboards for kitchen supplies, because they have a convenient place for all the necessary things and no waste space.

WOODWORK AND WALLS.

The finish of the woodwork and walls of the house is part of its permanent equipment which plays an important rôle in its general attractiveness and the ease with which it can be taken care of. Woodwork of the baseboards, doors, window casings, etc., should be easy to dust and wash. This means round corners and no elaborate moldings. Whether or not such surfaces should be painted or stained and varnished depends partly upon how good the wood is and partly upon personal taste. As a general rule, varnished woodwork is easier to keep in order than painted, but paint covers up poor wood better and can be used in lighter colors, a point which is often in its favor in rooms where there is insufficient light or where a "light" treatment in color and furnishings

is desired. Good enamel mixed with the last coat of paint prolongs its life and makes it easier to clean.

For floors, paint is less durable and harder to clean than well-finished waxed varnish, but if the boards are old and rough it would probably be better to paint them. Carpets or mattings tacked down close around the baseboard may be warmer in winter than rugs which do not cover the whole floor, but they are less desirable, because it is so difficult to take them up and clean them. Not only must the tacks be removed from the carpet, but their larger size makes them more difficult to handle than rugs. For months they remain full of dust and dirt which flies into the air when they are walked on, and for this reason they are very insanitary. If a floor is too bad for ordinary rugs, it is better to paint it and then lay down a carpet rug large enough to cover all but the edges than to tack a carpet over the whole floor. For the floors of kitchens, bathrooms, and passageways which must be washed frequently some material less absorbent than wood is desirable. Cement is sometimes used for back entries, pantries, etc., but it is hard and cold underfoot for the kitchen. Good, heavy linoleum is perhaps as satisfactory as anything for kitchen, laundry, and bathroom, as it is comfortable underfoot, easy to clean, and very durable. Oilcloth is cheaper, but not so durable.

Walls may be painted with any of the good water or oil paints or covered with paper. For rooms where the walls need frequent cleaning or where water is likely to be splashed on them, as in kitchens and bathrooms, a paint which will not be injured by moisture or some varnished paper or other waterproof material is preferable. In other parts of the house the ordinary wall papers are most common because they can be obtained at almost any price and in a great variety of styles and colors. Fashions in wall papers vary from time to time, taste inclining sometimes toward darker tints or larger figures, sometimes toward lighter colors or inconspicuous designs. Such changes in style are not important, however, and the selection of paper suitable for the room is always more satisfactory in the long run. In wall papers, as in furniture, many of the best designs now on the market have been adapted from old ones of different periods. Tapestry effects, for example, are suggested by the real

tapestries which covered the rough walls and broke the drafts in medieval houses, and some of the floral designs come from the silks and velvets with which the luxurious palaces of Italy and France were hung. These have stood the test of time because they are in accordance with the fundamental principles of decorative art. One of the reasons why the wall papers seen in so many rooms are unsatisfactory is that designs good in themselves are used in places where they do not belong. Because a bold floral design carried out in rich brocade looked well on the walls of a Venetian palace, it does not follow that a similar design imperfectly reproduced on paper would look well in a small room of a simple frame house in this country. Extreme designs are always rather difficult to adapt successfully, and it is usually safer to choose simple effects which are sure to prove satisfactory.

It is usually better to consider the wall covering of a living room as a background than as a decoration. This is especially true if pictures are to be hung against it. In wall papers, as in dress, inconspicuous designs and neutral colors are more satisfactory for "steady wear" than the reverse, particularly if one is limited as to cost, for "showy" material of poor quality soon reveals its cheapness.

The exposure of a room and the amount of light in it should be considered in choosing the color for the walls. It is well-known that cream, yellow, and yellow-brown shades on the walls of a room with northern exposure "warm them up" and that soft greens and grays temper the light in sunnier rooms. As a rule large, striking designs should not be used in small rooms. Stripes also should be used cautiously, especially where the rooms are high. The most satisfactory designs are often those in which the figure almost covers the background or in which the color contrast between the two is not very striking. Some of the best ones combine different tones of the same colors in the background and the figures. Pl. XXVII, *A*, shows an example of a paper with an inconspicuous design in two tones of soft brown, in contrast to Pl. XXVII, *B*, which though well designed is unsuited to a moderate-sized room in an ordinary house on account of the strong color contrast between figures and background, and the size of the pattern, the largest flower being some 12 inches in

diameter. A plain paper, such as cartridge or the various so-called "textile" or "oatmeal" papers, can be obtained in good colors and at low cost and is always safe to use. There has been a great improvement in the designs of inexpensive papers in recent years, and attractive ones can be found at almost any price.

The color of the walls usually determines the color of the other furnishings of the room, and really good and pleasing effects in house decoration depend more on such color combinations than on any other single factor. If wall and floor coverings, curtains, and upholstery all blend, the effect will be much more pleasing and harmonious to the eye than if each stands out from the others distinct and hard. A single spot of rich color against such a blended background, say, a table cover, or a sofa pillow, will do more to brighten a room than brilliant colors spread indiscriminately over the walls and furniture. Just as the principal objects in one room should harmonize in color, so adjoining rooms should show in harmonious colors. A hall, for instance, should usually be in neutral tones, so that its color will not clash with the rooms opening from it.

TEXTILES FOR HOUSEHOLD USE.

Textiles of one kind or another make an important part of the changeable equipment of a house. Carpets, rugs, curtains, furniture covering, household linen, blankets, etc., all come under this heading. A general knowledge of the different fibers—cotton, wool, silk, linen, etc.—of which these materials are made, the effect and durability of different dyes, the values of the different methods of cleaning, etc., would evidently be a help to the practical housekeeper. Much has been written regarding color, design, and other matters pertaining to household textiles from the standpoint of the fine arts, but many of the other questions, especially regarding durability, strength, etc., have not as yet been systematically studied. Some of those which bear most directly on everyday household processes are being investigated in this department by laboratory methods, and it is hoped that as useful results may be obtained as have been gained from the scientific investigations of food materials. In the meanwhile, general practical experience is a great help in selecting such furnishings.

As has been pointed out, tacked-down carpets and mattings mean too much work in cleaning to be recommended, and movable rugs of some kind are much to be preferred. Rugs large enough to cover the whole floor are not as easy to handle, but stay in place better than small ones. In choosing rugs, one should select those which are firmly woven and which lie flat. If they are too thin or loosely woven they will work up into wrinkles or ridges, especially if they are large. Good oriental rugs are very beautiful and wear a long time, but they are too expensive to be generally used in the majority of homes. Carpet rugs are now manufactured in a great variety of shapes, sizes, materials, and designs, and are very satisfactory. Some of the best are those adapted from oriental ones. Good Brussels and some of the firmer of the pile carpetings are excellent, as are also those which resemble the heavy, old-fashioned "three-ply" ingrains. Old-fashioned rag rugs and their modern imitations have an attractive, pleasing style of their own. They are especially appropriate for bedrooms and bathrooms, but are often too thin for places where there is constant passing. Matting rugs, which now come in good tones of the standard colors, often prove useful, though they are not so durable as good wool. They are particularly suitable for warm climates.

What was said of color and design in relation to wall paper applies also to carpets and rugs. Soft colors and inconspicuous figures wear better to the eye and harmonize better with the other furnishings than gaudy figures on a bright background. The rugs should tone in with the coloring of the walls and should ordinarily be darker in shade than the latter, not only because they show soil less, but also because they seem to bring the room and its furniture into their proper relations.

Window curtains serve the double purpose of regulating the light and of breaking the hard, straight lines of the casings. Window shades of Holland or similar material are more satisfactory than draperies for shutting out strong sunshine by day and securing privacy by night, but they do not soften the general light of the room as do draperies. The latter, if they come next to the glass, should be light in color and texture and should be easy to launder. If a little

color is desired around the windows, the fashion of hanging straight curtains of some thicker colored material inside thin white ones of lace or muslin is an excellent one. Some housekeepers use only the thin ones in summer when coolness and air are wanted, and put up the heavier, darker ones when cold weather makes the effect of warmth desirable.

In choosing bed coverings the principal thing to remember is that one wants as much warmth with as little weight as possible. For this reason wool is preferable to cotton or to wool and cotton mixed for blankets, comforters, etc. Linen sheets and pillowcases have almost disappeared from general use because of their high price. Cotton ones are, for all practical purposes, quite as satisfactory. All bed coverings should be large enough to tuck in firmly all around the mattress, a point especially to be remembered in buying ready-made sheets, which are sometimes too short for ordinary beds.

It is generally agreed that some material which can be easily laundered is the best for tablecloths, napkins, etc. Real linen is preferable to cotton or cotton and linen mixtures, because it lies flatter, does not look "mussy" so soon, does not leave lint on the clothing, and takes a better luster in laundering. As in almost all textiles, a firm weave is more durable than a sleazy one. Provided the threads are smoothly twisted, coarse table linen is as durable as fine, but it is not as handsome. White is usually preferred to colored material, both because it stands more washing and because it shows at once whether it is clean or not. If neatness is desirable anywhere it must be at the table where we eat, and though white tablecloths mean much washing for the busy housekeeper, she should think twice before she substitutes dark-colored cloths which may be dirty before they have to be changed "for appearance's sake."

Linen is usually considered more satisfactory than cotton for toweling, because it absorbs water fully as easily and dries more quickly. Too firm a weave or too heavy a thread is not desirable, in spite of greater durability, for these make it less absorbent. For hand towels many persons prefer a rough weave like huckaback to a smooth one like damask, not only because it is more absorbent, but also because it gives a better friction to the skin.

There is such an infinite variety of materials for furniture covering that it is almost impossible to include all types in a brief discussion. Leather, wool, silk, linen, and cotton are all used. Leather is dignified looking, and the good qualities are durable, but in the cheaper grades the surface tends to wear off and crack, and it is often rather stiff and uncomfortable. Silk materials are appropriate in certain places, but are too expensive for common use, except perhaps for cushion covers, hangings, and possibly for the covering of a choice piece of furniture. Cotton is inexpensive and does not wear through quickly, but often it does not hold its color well and also catches dirt easily. Nevertheless it is frequently used in cretonnes, chintzes, and similar printed goods and in low-priced velours, tapestries, etc. It is worth noting that mercerizing and some of the other new methods of treating cotton during its manufacture have improved its appearance and also its wearing qualities. Linen is occasionally used in materials similar to chintzes, but its most common use in furniture covering and draperies is in velour, a sort of heavy velvet material which is also made in cotton, but which is more durable in linen. Except for the fact that moths and buffalo beetles are so likely to damage it, wool is probably the most satisfactory fiber for upholstery. It is more durable than silk or cotton, does not catch the dirt as easily as the latter, and holds its color excellently. It is made into a great variety of materials—damasks, tapestries, plushes, etc.

The use to which the room is to be put influences the selection of materials in furniture coverings and draperies. Gay, light chintzes or cretonnes are appropriate for a bedroom, which one wishes to have clean and airy looking, whereas for a living-room substantial looking material like velour or tapestry would be more suitable.

FURNITURE.

In furniture itself, good quality depends on well-chosen materials, good design, and good workmanship. Wood is the most common material, but metal is sometimes substituted for bedsteads, and wicker or rattan for chairs, couches, and small tables. Soft wood, especially pine, is used for cheap painted chairs, kitchen tables, etc., but harder varie-

ties are preferable for general use. The important qualities in furniture wood are strength and beauty of grain, though color is also a consideration. Oak is probably the most common kind now used in standard-grade furniture, and mahogany is always in demand for handsome pieces. Bird's-eye maple, cherry, rosewood, etc., are also occasionally seen. Black walnut is another beautiful wood for furniture, but it is seldom seen in new pieces now, partly because the supply has run short and partly because it is chiefly associated in our minds with the heavy, overornamented style of furniture for which it was used some 50 years ago and which has now fallen into disfavor. Some of the more expensive woods are imitated by staining cheaper kinds.

The advantages of wicker furniture should not be overlooked. It is light, comfortable, and durable; some of the simpler designs are very good and combine well with other kinds of furniture, especially when the wicker is stained a harmonious color.

Any piece of furniture should be and should look strong enough for the use to which it is to be put. Chairs and couches should be selected for the comfort of the persons who use them, and a living room should be provided with a sufficient variety to suit all the members of the family. As regards design, those which suggest comfort and strength should be chosen rather than "gimeracky" types, and if there is any ornamentation it should be placed where it brings out the important lines of the piece rather than seem to be put on for its own sake.

The number and size of the pieces of furniture in a room should bear some relation to the size of the room. Though crowded tables, insufficient bookshelves, or too few chairs are inconvenient, having a room so full of furniture that one bumps into it at every turn is even worse.

It should not be forgotten that well-distributed empty spaces add to the beauty of a house. In cities where extra space means extra cost, small, overcrowded rooms are sometimes unavoidable, but women who are so fortunate as to live in roomy country houses ought to make the most of their privileges and give their families the pleasure of ample space, even if this means banishing to the attic a few superfluous pieces of furniture.

TABLE AND KITCHEN UTENSILS.

Table and kitchen utensils make up another important group of furnishings. Very often the same kind of articles in different qualities are found in both sets. Table plates (Pl. XXVIII, *A*), for example, differ from kitchen plates more in their attractiveness than in any other way. Real china or porcelain, which is always translucent and of which the choice tablewares are usually made, is more suitable for occasional than general use because it is rather fragile, but its light weight, fine color, and smooth surface are undeniably beautiful. Earthenware with a good glaze usually ranks next to porcelain and is very satisfactory for general use. The old blue and white Staffordshire wares, which were so highly prized in colonial days in this country, belonged to this type, and similar ware (see Pl. XXIX, *D*) is still to be obtained in many satisfactory designs, one of the common ones being the well-known willow pattern. Large and conspicuous designs usually become tiresome on things which are used as frequently as table dishes and it is safer to select plain white or some allover pattern or inconspicuous bands of flowers, color, or gilt. It is usually wiser to buy tableware from an openstock design than to take the regular sets, which often include unnecessary pieces and can not always be replaced when broken. Good, plain shapes are ordinarily to be preferred to more fancy ones, because they are better adapted to their purposes and are easier to clean than those which have irregular surfaces and "nubbles" which catch and hold the dust. Pitchers, teapots, and other dishes with openings so small that the hand can not be inserted to wash and wipe them are to be avoided. Plate XXVIII, *B*, illustrates a teapot which is hard to clean on account of both the elaborate handle and the small opening. Kitchen crockery, like tableware, should have a good, smooth-finished glaze which will clean easily and not chip.

Glassware is to be obtained in almost any grade, from the most expensive cut glass to the coarse kind used in jelly tumblers. The choice depends chiefly on the pocketbook, but it should not be forgotten that plain glass or glass cut in a simple pattern is easier to keep shining and is usually

more beautiful than any except possibly the very expensive types of elaborately ornamented glass. Plate XXIX, *C*, shows a pitcher of plain inexpensive glass and a shape which is both graceful and easy to care for.

Knives, forks, and spoons are made in several kinds of metal. Silver is the most durable and always has an intrinsic value. Plated silver is made so well and so cheaply nowadays that almost every family can have at least a supply of forks and spoons. Many prefer steel-bladed to silver knives for the main course at a meal because they cut better, but they are harder to care for than silver or plated ones. Tea sets, pitchers, and other serving dishes come in good designs in plated as well as solid silver. If the family happens to own handsome ones, they make appropriate sideboard ornaments; but they require frequent rubbing up to keep them bright, and unless they are needed every day on the table it is better to put them away and reserve them for special occasions than to let them stand about tarnished.

There is much discussion as to the best material for cooking utensils. The truth is that no material is best for all, and the work is most easily and satisfactorily done if different kinds are chosen for different needs. Earthenware is excellent for certain purposes, as it holds the heat evenly, and baking dishes or casseroles in which the food can be served as well as cooked save dish washing. Such wares are not adapted to all kinds of cooking, however. The great heat of fat in frying, for example, especially when the hot fat spatters up against the cooler parts of the dish, is likely to crack it. Enameled ware is light in weight, easy to clean, and is little affected by acids; it is excellent for mixing dishes and for keeping food in, but the cheaper grades do not always stand the heat of cooking well and soon chip. The enamel should be free from bubbles and have smooth, evenly finished edges which will not chip readily. Aluminum heats quickly and so economizes fuel, comes in very good shapes, is light to handle, and very durable; it is affected by alkalies, discolors easily, and is rather hard to clean. Nevertheless, since it does not rust, it is especially desirable for teakettles, double boilers, kettle covers, etc. Cast iron is still common ware for kitchen utensils, but it is being replaced in many homes by materials which are lighter in weight and less

expensive. Good iron pans and skillets are excellent for some kinds of cooking, however, because they heat more evenly than those of other materials, and they last for generations. Iron rusts easily and is affected by acids as aluminum is by alkalies. It is because of this action of acids that iron dishes sometimes injure the color and flavor of food, and for this reason food, especially acid food, is usually not allowed to stand in them. Tin and sheet iron plated with tin are in common use in most kitchens because they are rather inexpensive, but they are not entirely satisfactory. Unless they are unusually heavy, they lose their shape quickly. In thinly plated kinds the tin wears off and the iron beneath rusts easily.

The shape of kettles has much to do with the quickness with which their contents heat. The smaller the surface which comes in contact with the heat, the longer it will take the contents to become warm, and vice versa. This means that in a kettle with a broad base the contents heat more quickly than in one with a small base. This point should be especially considered where gas stoves are employed and fuel must be carefully used.

Because a thing is to be used in the kitchen is no reason why it should be ugly to look at, and if the housekeeper can find mixing bowls and kettles which are attractive in shape, color, and finish, as well as convenient and easy to clean, they will give her a sense of pleasure every time they are used.

ARRANGEMENT OF KITCHEN FURNITURE.

Since the kitchen and laundry are the rooms where the hardest part of the household labor is performed, the question of efficiency in their equipment is especially important. This efficiency depends not only on having the most convenient devices for doing the work, but also on having them placed where they can be most conveniently used. If a woman has to go to a distant closet or pantry every time she wants a dish or a little flour, or even if she has to cross a large room as she moves between the stove and the worktable, the sink and the cupboard, she will waste a considerable amount of energy in the course of a day's work. It certainly is worth her while to study her movements as she works and see if by changing the place in which some things

are kept or by moving the worktable or the kitchen cabinet she can not reduce this waste of energy. As has been already suggested, the height of worktables, sinks, and laundry tubs has much to do with the ease of working. Different kinds of work, of course, call for tables of different heights. Ironing, for example, which consists of pressing down hard, is easier on a lower table than would be chosen for general work. The height of the worker also makes a difference. From 32 to 36 inches from the ground is the usual height for general worktables, and the bottom of the sink should usually be 30 or 31 inches from the floor; but it is better for each housekeeper to test out the matter for herself before she buys a new table or has a new sink set up than to trust to general rules. These and other points in kitchen equipment have been discussed in a recent Farmers' Bulletin.[1] Plate XXX shows a woman working at a table of correct height and at one which is too low, and makes clear how much discomfort and unnecessary effort comes from bending over the latter. An attempt is being made in the calorimeter laboratory of the Department of Agriculture to measure exactly how much energy is expended at tables of different heights, and it is hoped to extend the work to include the expenditure of energy during various household tasks performed under favorable and unfavorable conditions, so that questions of efficiency in housework can be placed on as accurate a basis in the dairy or the factory. A table (see fig. 20) with an adjustable top which permits the working height to be easily changed has been made for experimental use in the calorimeter laboratory, and the same principle might be applied for use in the home.

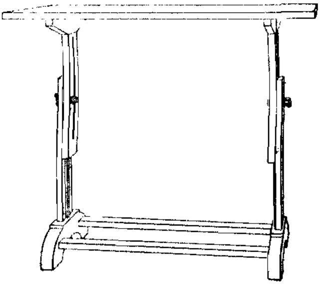


FIG. 20

[1] The Farm Kitchen as a Workshop. U. S. Dept. Agr., Farmers' Bul. 607 (1914).

IMPORTANCE OF STUDYING HOUSEHOLD QUESTIONS.

A generation ago such subjects might have been thought beneath the dignity of scientific investigation, but the last few years have seen a great change in this respect. The way in which our homes are run, or, in more technical terms, the science of home economics, is now in much the position that scientific agriculture was in 20 or 30 years ago. The leaders had shown that science can improve crops and some of the more progressive farmers were giving the new ideas a practical test, but many of the rank and file were still doubtful whether it was worth while. Few farmers of to-day, however, would care to go back to the days before experiment stations, fertilizer control, etc. The fact that the problem of making the home as efficient as possible includes so many different kinds of questions will make necessary a great deal of study along many different lines, just as agriculture has included problems as different as those of insect pests and cheese making. In solving these every intelligent farmer who has studied them on his own farm has done his part as well as the special investigators in the laboratories. In the same way, every intelligent housekeeper who studies the household problems of cooking, cleaning, and furnishing and tries to solve them with the help of both practical experience and scientific information hastens the day when household management can be as accurately planned as that of the factory and the farm.

Planning and equipping a home in an accurate and systematic way does not mean that it should not have any individuality. On the contrary, while the principles which govern a wise choice of furnishings are the same for all kinds and conditions of houses and families, the articles actually chosen in accordance with these principles would vary just as much as the house and the families for which they are intended. Whether one's house is large or small, things should be chosen to fill actual needs, and to fill them in the way most economical of money, labor, and materials, and, as far as possible, to give pleasure as well. If the house or the family is large, different things will seem necessary, convenient, economical, and suitable, from those which would answer the requirements if there were less space or fewer persons to be provided for. The size of the income also

influences choice, but the fact that one can not pay high prices does not mean that one must always put up with inconvenient or unattractive things. A table of easy working height probably costs no more than one too high or too low, nor would making wooden blocks to set under the legs of a low one be an impossible expense; yet a difference of a few inches may mean the difference between working easily and getting tired every day. Increasing the convenience of working by such simple means as moving a table or stove or rearranging the kitchen cupboards or kitchen cabinet may make a noticeable difference in the number of movements necessary for the daily work, and this saving of energy not only lessens the labor, but also prevents the irritation which an intelligent person naturally feels at wasting effort.

As far as the element of pleasure or beauty is concerned, it is the necessary things rather than special ornaments which make the greatest difference in the attractiveness of a home. Comfortable furniture of good plain design and harmonious colors on the walls and floors are more necessary to make a house restful and pleasant than many pictures and much bric-a-brac. Fortunately, it need not cost any more to get these necessary things in satisfactory forms than in poor ones, though it may mean choosing more slowly and carefully.

If the best equipped house is the one which in all its features and furnishings are most completely suited to the needs of its occupants, the standard for every family must be adapted to such individual peculiarities as the location of the house, the amount of the family income, the size of the family, and their different occupations and interests. Judged by this standard, a woman who, with limited means, has made a convenient, comfortable, and attractive home out of an unpromising, inconvenient farmhouse has shown greater ability than one who, with the help of an expensive decorator, has obtained a good effect in a house equipped with all modern improvements.

THE EGG AND POULTRY DEMONSTRATION CAR WORK IN REDUCING OUR $50,000,000 WASTE IN EGGS.

By M. E. Pennington, H. C. Pierce, and H. L. Shrader,
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A LARGE refrigerator car, painted white, and bearing on its sides the inscription "U. S. Department of Agriculture, Poultry and Egg Demonstration Car," was backed down a railway siding in a typical southwestern town and came to a stop about two blocks from the station. There it remained while the heterogeneous mass of freight cars to which it had been attached rumbled slowly away to disappear in the north. Two men carrying sweaters that seemed strangely out of place with a temperature that particular morning in the neighborhood of 105 degrees in the shade came toward it from the station, unlocked the door, let down a flight of steps, and entered. A moment later came the regular throbbing of a gasoline engine, the whir of large fans could be heard, and incandescent bulbs began to flood the interior with light. The men put on their sweaters, for it was suddenly getting cold.

The Department of Agriculture's demonstration car was now ready to begin its daily business of trying to reduce the $50,000,000 annual waste in eggs. Part of this loss can be debited to needless breakage of eggs in transit from the nest to the retailer. The balance represents the unnecessary addling, spoiling, and deterioration of good eggs that comes from bad handling on the farm, on the way from the farm to the town, in the town, in transit from town to city, and in all stages of progress from the carload lot to the breakfast table.

The importance of the loss of eggs which has occurred by the time the product reaches even the country shipping centers can be seen from reports of 20 prominent shippers in a single egg-collecting point. These men reported that one year the percentage of eggs which arrived in a state so bad that they were an absolute loss rose to 8.33 per cent in November, with

a mean loss for the year of 4.36 per cent for the 32,730 dozen eggs, or over 1,000 cases, which were specially examined. The loss in eggs between the time the hen lays a fresh egg and the time when that egg is traded or sold to the country merchant may be judged also from the fact that a special inquiry conducted among country storekeepers in October showed that only 25 per cent of the eggs they secured from the farmers would rank as "firsts" and that 60 per cent were "seconds," due to long holding on the farm; that 5 per cent were cracked; and that 4 per cent were rotten or stuck to the shell. Some of the farmers, it was found, had held eggs for four weeks before turning them in at the village store.

These two inquiries indicate clearly the cause of the huge number of eggs which merely add to the crematory and dump-heap bills of our great cities or reach the markets in a condition in which they can be endured only by unusually strong palates, or used for tanning leather. This vast quantity of spoiled eggs is an unpleasant monument to needless American waste of good food in the face of increasing population and lowered food production.

Reports had reached the Department of Agriculture that the shipments of eggs at this particular time from the southwest were showing far more than the normal number of "floaters," "blood rings," "white rots," and "black rots," which are terms employed in the egg-handling trade to represent the different stages of descent from a good egg into a very bad egg. These reports came from near-by egg-collecting centers, and some of them came even from distant New York, where the housewife was complaining about trouble with her egg supply. A preliminary investigation in the district showed that unusually hot, dry weather was leading to a loss from spoilage of over 30 per cent of eggs in this particular county. This meant that for want of a little extra care the farmers of the county were throwing away fully $1,000, or the price of an automobile, every week.

Instructions began to go out from Washington: "Send the egg car to central Texas and travel north during May." In response to these orders the car was delivered at this particular station on a hot May morning, and thus was added another fraction to the 7,000 miles the car has traveled during the last two egg-laying seasons on its egg-saving mission in

Kansas, Oklahoma, Texas, Arkansas, and Missouri, the corn States which produce a vast proportion of the eggs consumed in the great cities of the East. In all these States the car has been helped on its way by the hearty cooperation of the railroad authorities, who were among its earliest converts, for they were quick to see that spoiled eggs spell profit for nobody.

The demonstration car (Pl. XXXI, fig. 1), while looking like an ordinary refrigerator car on the outside, is fitted up inside to be an egg packing and chilling establishment on wheels. In one end is a huge ice bunker holding over 3 tons of ice, and at the other end is a good-sized gasoline engine for running the cold-air fans and driving the dynamo which supplies light. By means of false walls running from the ice chamber, the fans are able to drive chilled air to all parts of the car and thus make possible the proper precooling of eggs for shipment and the testing, packing, and handling of eggs at temperatures which prevent or delay spoiling.

The chilling of eggs is almost the beginning and end of keeping New York and other great cities supplied. Heat is the great enemy, for once a good egg has stood for any time at a temperature of over 68° F. it begins to incubate, if it is a fertile egg, or to spoil, if it is an infertile egg. For this reason the car is equipped to give each railroad town it visits a practical demonstration of the advantage of keeping eggs cold and chilling them thoroughly before starting them in refrigerator cars on the long haul from the corn belt to the great egg-consuming centers.

In another section of the car are two egg-candling rooms (Pl. XXXI, fig. 2), supplied with electric lights, some of which are equipped for candling eggs by being inclosed with dark coverings in which there is a single hole the size of a half dollar. In these dark rooms the experts hold the egg before the candling light, and its condition is instantly revealed with almost photographic clearness. The purpose of candling eggs at home, of course, is to decide which of the housewife's dozen is in perfect condition for breakfast or cookery. On the commercial scale, the testing is to determine not merely whether the egg at the moment is good for immediate consumption, but whether, if properly chilled, packed, and handled, it will survive a long shaking up on a 1,000-mile railroad

trip and remain good in transit, storage, and the retail store until it reaches a distant home. For unless an egg starts on its journey in absolutely good condition, no amount of refrigeration or careful handling will restore it to goodness. And the egg that has begun to deteriorate, that shows the first sign of the incubation of its germ, spoils rapidly every hour that it is subjected to ordinary summer temperatures—in fact, every minute that the fresh-laid egg spends in the nest or elsewhere exposed to more than 68° F. starts it on a downward career. As the temperature mounts, the egg approaches hatching conditions. At 102° F. it might as well be in an incubator or under a hen. Direct exposure in the farmer's wagon, or in a case at the depot, to the rays of the summer sun and heat of 105° to 110°, hastens incubation and the development of bacteria and chemical changes that make the egg impossible to keep and unfit for food.

The one way to tell about the contents of an unbroken egg is to hold it before the light. Testing millions of eggs in this way has enabled the testers to tell just how each grade looks. To assist those who are not experienced candlers, the Government has printed carefully colored lithographed charts which show the exact appearance of different grades of eggs before the light. With this chart the egg dealer and even the housewife is enabled to candle eggs with sufficient accuracy.

The absolutely fresh egg held against the light shows a distinctive pinkish glow of goodness. Let that egg, however, remain out in the sun or in the summer heat for a little time, and within a day or two it begins to show "blood," a tiny series of little blood vessels forming around the embryo of the chick; or the heat may cause the yolk to go toward the top and shift easily, which characterizes it as a "light floater." Again, the yolk may mix with the white and make a "white rot," a condition also revealed by the candle. The final stage is the "black rot," where no light at all can be seen through the egg. The egg has now reached the explosive stage, which makes it such a favorite missile of the average boy. There is, however, another type of bad egg which most people would think good for food. The yolk is a firm golden ball and the white a clear liquid. But the white has a greenish color—and the green indicates that the egg is full of bacteria—it is a "green white egg."

After the candle has told its story the egg, if intended for long shipment or storage, must again pass examination before it has been classified fully, for an egg is no better than its shell. A perfect shell is one of the essentials of a good egg, because any crack or break in it will tend to let in all sorts of bacteria to hasten its putrefaction. The egg therefore must be graded not only by the condition of its contents, but by cleanliness and soundness of shell as well. An egg that is so badly cracked that its contents escape is termed a "leaker." A "leaker" not only will not keep itself, but it may soil and injure a large number of eggs packed in the same case with it. They are thrown out, therefore, at every stage of handling and constitute a total loss. "Checks" are eggs the shells of which are cracked but the membranes still intact. These, too, are sure to rot quickly. Even if their contents are perfectly fresh, they can not be held for any long period. The egg with a dirty shell, no matter how good its contents may be, does not bring a high price on the market. It is unpleasant for the housewife to handle and can not be served in the shell. Washing dirty eggs, however, hurts rather than helps them, for the reason that any water put on an egg washes off some of the protective covering which the hen puts on the shell to make it more resistant to the entry of germs. A washed egg is shiny and smooth looking and lacks the powdery bloom of a clean fresh egg that has not been washed. One of the duties of the egg tester, therefore, is to detect the egg which has been washed to escape the lower commercial grade assigned to those with soiled shells.

The commercial egg handlers in the large cities understand fully the importance of the delicate candling tests and the careful examination and classification of eggs according to shell condition. In some cases the middlemen—largely the country merchants or egg collectors of the small railroad towns of the egg-producing districts—understand candling, but frequently conduct this operation more or less roughly and do not always grade the eggs accurately. Many of them will count as nearly fresh or "strictly fresh," eggs which under the careful candling of the cities would be put in other than the highest grades. Similarly in the other gradings their candling is not nearly so exact as the work in the great egg

centers. A partial explanation for this is that the country egg collector is interested merely in getting his eggs 200 or 300 miles to the nearest wholesale egg-collecting market. The big candler in the city, however, must decide what eggs are good for the fancy trade and what eggs to sell as second and third class. Moreover, in the winter the city candler must candle the eggs that have been kept for months in cold storage to satisfy the egg hunger of the great cities during the seasons when the sturdy gray hen is not laying.

Without such provision for the cold storage and canning of large supplies, a palatable boiled egg in the winter in the great cities would be a luxury entirely beyond the reach of any but the wealthy. The day when the housewife purchased her eggs from a near-by hen-keeping neighbor has passed. Few of the city dwellers ever hear a hen cackle, except at the annual poultry shows, and not one out of ten thousand could go directly to a place where she could get eggs taken fresh from the nest. The luxurious eggs which sell at from 60 cents to a dollar a dozen do come largely from the environs of the large cities, but the bulk of the egg supply travels for distances sometimes as long as 2,000 miles to reach the markets on the Atlantic coast. This has transformed what once was a matter largely of personal barter between neighbors or between the country woman and the storekeeper who supplied his own retail customers into a vast and complicated food industry employing thousands of people and many millions of capital. To-day the egg starts on its trip to the big markets in the farm wagon, and for the woman of the farm each good egg in its shell is practically so much cash. In fact, eggs and chickens supply a large proportion of what might be called the ready spending money of the farm woman. The local merchant pays her for her eggs either in money with which she pays her doctor's or dentist's bills or buys articles for the home, or else immediately transforms the eggs into calico or shoes or groceries. The country storekeeper similarly regards the eggs as money and deposits them with the local egg collector and shipper, who honors the poultry check and turns back the cash to the storekeeper. From this point of view the local egg shippers might be regarded as running an egg bank. After the egg shipper at the local station starts his eggs toward the collecting centers

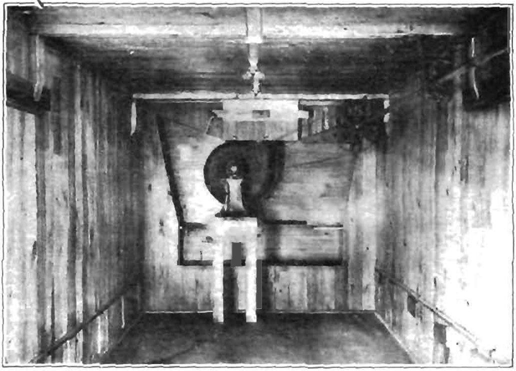


FIG. 1.—INTERIOR OF CAR, SHOWING VENTILATING FAN, HOLES IN THE CEILING, AND THE OPENINGS IN THE FALSE SIDE WALLS NEAR THE FLOOR.

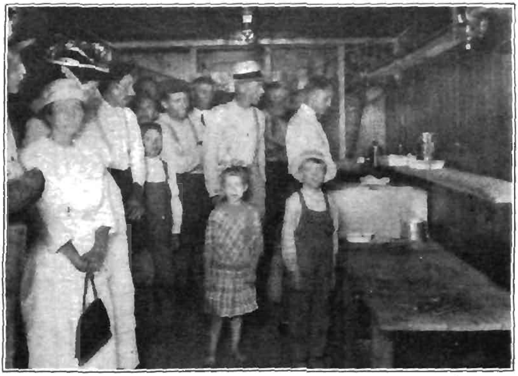
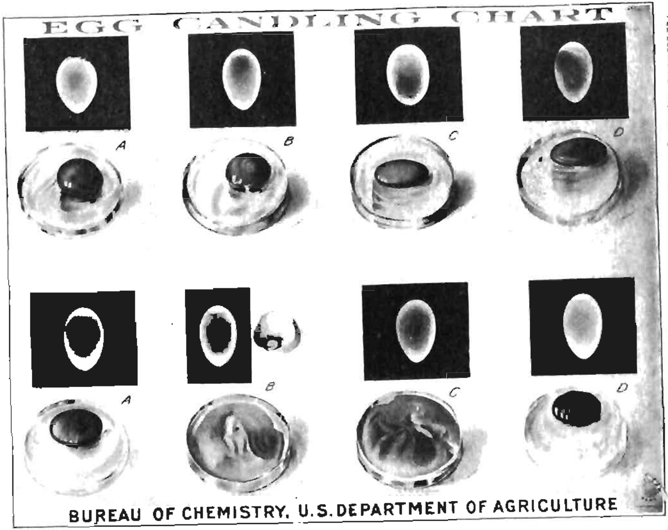


FIG. 2.—A DEMONSTRATION IN THE CAR OF GRADING EGGS BY MEANS OF THE CANDLE.



WHAT THE CANDLE SHOWS.

UPPER.

A. A fresh egg, before the candle and out of the shell.

B. Slightly stale egg, showing evidence of incubation, before the candle and out of the shell.

C. Stale egg, showing a settled, flattened yolk and a thin white, before the candle and out of the shell.

D. Egg with yolk beginning to adhere to shell, before the candle and out of the shell.

LOWER.

A. Egg showing blood ring, before the candle and out of the shell.

B. Cracked egg invaded by mold, before the candle and out of the shell.

C. White rot or addled egg, before the candle and out of the shell.

D. Egg with a green white, before the candle and out of the shell.

KINDLY POST THIS NOTICE ON YOUR BULLETIN BOARD OR IN A PROMINENT PLACE

U. S. DEPARTMENT OF AGRICULTURE

Egg and Poultry Packing and Chilling Demonstration Car

Will Arrive at

Vinita, Oklahoma

May 27, 1914

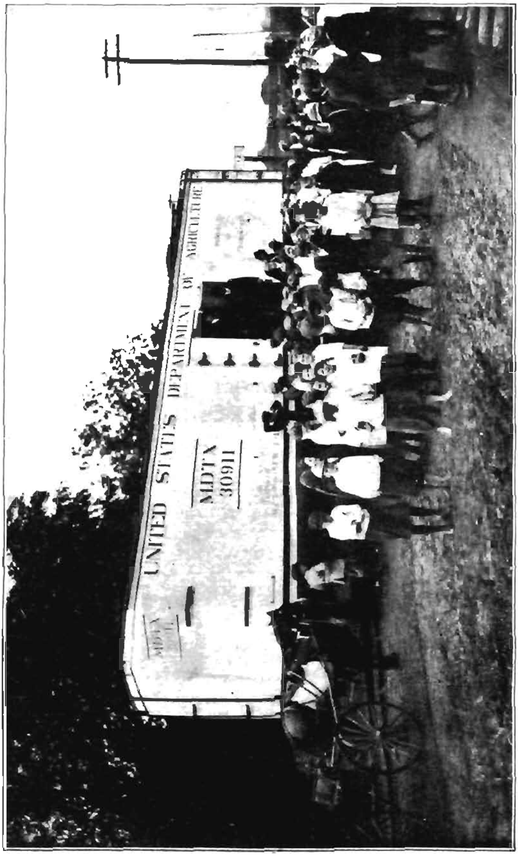
The two Department specialists in charge of the car will give demonstrations in dressing, chilling, and packing poultry and in candling, grading, chilling, and packing eggs for long shipment. The car contains a complete poultry refrigerating plant operated by its own gasoline engine.

All interested in shipping poultry products are invited to visit the car and take part in the practical demonstrations

THE CAR WILL BE ON A SIDE TRACK CONVENIENT TO THE A. T. & S. F. DEPOT

D. F. Houston
Secretary
U. S. Department of Agriculture.

THE PLACARD THAT ANNOUNCES THE COMING OF THE CAR.



School Children Visiting the Car.

in the large cities the egg then passes through practically all the selling agencies that attend the getting of any manufactured foods from the factory to the actual consumer. The difference, however, between the vast egg industry and big trade organizations for handling other staples is that while the capital involved in the egg collecting, handling, and storing business is very large, the trade is not highly centralized. The imposing total is made up of many small units—thousands of men in local towns who have invested a few hundred or a few thousand dollars in their branches of egg marketing. It is estimated that these men handle yearly a food product worth, to the consumer, $750,000,000.

One of the missions of the egg-testing car, therefore, is to show the egg collectors in the small towns how to standardize their grading so that their rating of an egg will be much the same as the later candling of the great egg handlers, and thus help them to send to their customers in the cities more nearly the grades of eggs they order. The local egg collector who does this gets a higher price for his standardized product, avoids sending eggs that are likely to smash in transit and make a "scramble," as the trade describes the case of eggs made dirty by other broken eggs, and also will save the freight and loss on spoiled and broken eggs shipped considerable distances.

In dealing with these local egg collectors—the town and country merchants and commission men—the Department of Agriculture's egg specialists follow the doctrine that "seeing is believing and doing is better than reading about it." In the distant past it was the policy to discover things and then send people printed descriptions of the discovery, possibly with black and white reproductions of photographs of what the laboratory investigator saw before the candle. It is not an easy matter for anyone to translate black and white into delicate differences of color, nor again, to visualize printed words into pictures and colors. Try as he would, the country merchant could not read black and white pages and see the delicate gradations of pinks and yellows and browns which the expert told him he needed in egg testing. Some improvement was made when egg-testing charts (Pl. XXXII) were printed accurately in color, but even here seeing the picture of an egg is not as effective as judging a basket of

eggs before the candle with an expert and then breaking some of them open to determine the mistakes of the eye. The department, therefore, sent out its car equipped with practical egg-candling rooms, and here the country merchant, under the tuition of the expert, can test hundreds of eggs before the candle until there is fixed in his mental eye the exact appearance of eggs of every grade.

Preceding the arrival of the demonstration car at each point, letters are sent to all commission men and local merchants dealing in eggs, inviting them to visit the car and take part in practical demonstrations of egg candling. In addition the railroad through its local agent notifies all egg shippers of the coming of the car. The department puts up in the post office and at other points in the village attractive placards (Pl. XXXIII) announcing the time of arrival of the car, telling of its work, and inviting those interested to attend. The schools through their pupils give notice to country parents of the arrival of the car, and finally the local newspapers are supplied with information and asked to spread through their columns the news of the car's coming and its usefulness to the county.

The doctrine taught is not especially altruistic and the invitations do not imply that the local egg man or farmer owes some philanthropic or social duty to a distant consumer. The argument is entirely one of dollars and cents in the pocket of the farmer and his wife, the local egg commission man, and in the general pocket of the county itself.

"Thirty per cent of your eggs are wasted. You are getting 30 per cent less money for your eggs than you ought to be getting. You are throwing away comforts, automobiles, luxuries, opportunities every week. It isn't a question of tools or money or capital. It is a question of care and intelligence which cost nothing but a little time. Come to the car and learn how to save $1,000 a week in rotten eggs."

If the egg car, with its doctrine of egg conservation, reached only the collectors, it could save but a fraction of this waste. Eggs do not stay good as long as they are in the country and suddenly become bad when they come to town. An egg is full of original sin from the moment it is laid and asks only for a little leisure in a warm place to indulge in all its proclivities for wickedness. The egg that

is laid by the hen who steals her nest in the field, and is allowed to stay out in the heat for two or three days, until the hen's hiding place is discovered or it happens to be convenient to gather the eggs, has begun to spoil before it reaches the house. Similarly the morning laying, if left all day in the heat or in a hot henhouse over night, will begin to develop the hatching germ. Good fresh eggs put in a basket and stored in the hot kitchen for a day or two may reach town in such condition that they must be used at once to be available for food. A basket of perfectly fresh eggs left in the back of the wagon and exposed to the sun during a 10-mile drive to town may reach the country merchant in such shape that not even immediate chilling will make them available for long shipment to the cities. This is the story constantly revealed by the candle on the egg car. Eggs of which the farmer's wife is very proud will show that they have been allowed to remain 24 or 48 hours in the nest or at some point in their history have been exposed to heat which lowers their value. It is evident, therefore, that if the egg is to be palatable to the city consumer care in its handling must begin on the farm. The farmer must gather his eggs twice a day and must keep them cool afterwards, just as he would cream or milk, until they are delivered in town. There the merchant must at once put them into a dry, cold place, or, if he wishes to be strictly up to date, must chill them in his own little refrigerating plant or in the large refrigerating plant of the town, to a temperature well below 40° F.

Realizing that egg conservation thus stretches right out to the farm, those in charge of the egg car make a special effort to induce the actual egg producers coming to town on the day when the car is giving the demonstration to bring with them baskets of eggs to be candled. These invitations, in which the local merchants commonly cooperate by making the day a special reception day for their country customers, bring farmers from a radius of 15 or 20 miles, and in some cases induce progressive men to come by train from towns within 20 to 40 miles.

The demonstrations for the farmers and their wives in candling are the same as those for the commission men. The effort here, however, is principally to get the farmers themselves to candle and grade their eggs before they start for

town and then to offer the buyers their eggs on a quality basis. This means that the farmer offers so many dozen of fancy eggs at a certain price per dozen and so many other eggs of different grades at smaller prices. Inasmuch as the size and the condition of the shells of eggs count, the farmer is advised also to consider these things, which affect the market value of eggs. Under this plan the farmer quickly finds that he makes more money by selling his eggs according to quality than when he simply sells them at an average price per dozen which the buyer has to make low in order to cover himself against off-size, off-color, dirty, cracked, checked, or deteriorating eggs. If the farmer has 1 dozen of 17-cent eggs and another dozen of 13-cent eggs, he gets 30 cents for his 2 dozen, whereas under the other basis he probably would get only 13 cents a dozen or 26 cents for his basket. In the absence of a quality basis of buying, the buyer either simply pays a lump sum, gambling on the quality of the eggs and naturally fixing a very low price, or buys on a "loss off" basis, which means that he deducts from the farmer's returns all the bad, leaking, or unmarketable eggs found in his offering. In either event the farmer has had the trouble of bringing worthless eggs to town and does not get the benefit of the high price that would be paid for the percentage of strictly good eggs in his basket.

The quality basis of buying is generally believed by students of the business to lie at the very foundation of supplying the large centers steadily with eggs of good quality.

Quality buying is equally important to the local storekeeper and small-town egg collector. This was illustrated accidentally one day at the car when two of the three principals in an egg deal met in the candling room. One of these, a dealer who bought on the case-count plan—that is, paid a flat price per dozen for the eggs, whatever their condition—brought a lot of 10 dozen eggs and asked that their quality be determined by candling. He had paid 13 cents a dozen for the eggs, and the candle showed that only eight dozen could be rated either "firsts" or "seconds." The remaining two dozen were so bad as not to be marketable under any grade. A quality buyer who was one of the group said, "Those look to me like the same lot of eggs that were brought to my place this morning. I offered 15 cents for firsts and 12 cents for seconds, but the woman who brought

them would not sell at this price, and said she could find an egg man who would take them all." The case-count buyer figured gloomily that he had paid about 16 cents a dozen for a mixture of "firsts" and "seconds," or 1 cent above the market price for "firsts." In another case it was found that a case-count buyer had bought the eggs that had been thrown out by a quality buyer. This practice, however, in many towns is being broken up by agreement among the merchants, who stamp rejected eggs and thus prevent their resale as "farm run of eggs."

In connection with the candling demonstration, the demonstrators of the car take particular pains to show each visitor, by means of photographs and actual eggs, the difference in the keeping quality between a fertile egg and an infertile egg, or one that is laid by a hen in a roosterless flock. The fertile egg, because of the chick germ in it, deteriorates very rapidly as soon as it is allowed to get warm. This deterioration appears as blood on the yolk, which is the first very noticeable evidence of the incubation of the chick. The next stage is the formation of the blood ring—a circle on the yolk—which appears when the embryo dies. The infertile egg, which contains no chick germ, will, of course, deteriorate if allowed to get warm, but as there is no germ to hatch, no "blood ring" develops and the physical changes in the contents are very much less marked, and the chemical changes which would make it inedible go on much more slowly. The infertile egg, therefore, will keep very much better and is a better product to put in cold storage for winter consumption. State poultry officials and the dealers in many cities encourage the farmers to remove roosters from their flocks after the season in which eggs for hatching are laid. This movement is aided by the fact that after the hatching season the dressed poultry and egg dealers frequently offer the farmer an attractive price for the roosters, which are then dressed and sent to market. In Missouri, it is estimated, 1,000,000 roosters were removed in one week from egg yards in this way. The specialists believe that if roosters can be eliminated from the flocks the losses in commercial eggs will be greatly reduced. The farmer gains from not having to feed the rooster, the absence of which makes absolutely no difference in the laying of the hens. The

infertile egg, moreover, is just as nutritious and desirable for food as the other.

The cold-storage plant in the car is designed for proving to the egg receivers of the towns the importance of chilling eggs to a temperature below 50° F. before they are shipped in refrigerator cars to the large cities. While this process would be of advantage if begun on the farm, it is realized that few poultry raisers can afford ice enough or the cost of even a small refrigerating machine for thoroughly chilling eggs. Instruction to the farmers in keeping eggs cool, therefore, is largely limited to such practical methods as storing in refrigerators or in the cooler places on the farm, such as the spring house, cold cellar, or ice house. Where none of these methods is available, the farmer is urged to gather his eggs quickly after they are laid and keep them ever after out of the direct heat of the sun. The value of refrigeration to egg shippers in the railroad town is so great, however, that every effort is made by those on the car to induce them individually or in combination to install refrigerating machinery large enough to chill the normal egg supply of their town. The egg specialists, by tracing hundreds of shipments of chilled and unchilled eggs, have demonstrated beyond question that the egg which starts cold and is kept cold arrives much better than the egg which is put warm into the refrigerator car. They have figures showing the exact number of hours required in an ordinary refrigerator car for a warm egg to be chilled down to the point where it no longer incubates or spoils. Other figures show how ordinary eggs, by means of a local refrigerating plant, can be brought down in 24 hours to the temperature at which they can safely be shipped. Eggs prechilled to this temperature remain at the safety point in the refrigerator car instead of having to travel for two or three days at dangerous temperatures until the ice in the refrigerator car can chill them. As a result of this demonstration work, many shippers who heretofore shipped warm eggs are now chilling the entire summer egg supply of their producing section and starting it to market in prime condition. In consequence, the eggs shipped by these dealers arrive at the great markets in essentially the same condition they were when candled by the local shipper. Disputes between the shipper and receiver as to the grade, quality, and price of

such eggs are growing fewer in the sections where precooling has become a general practice.

Another portion of the car, which is kept cool by the air blown from the ice bunkers, has been made into a small packing room, where cases can be filled and properly nailed for shipment. The purpose of this work is to show the egg shippers the safest way of preparing their product for the jolting it must receive in freight cars. The importance of this work is indicated by a recent study of the breakage of eggs in transit. According to this investigation, on an average of 24 eggs out of every 30 dozen packed in a case arrived at market either cracked, dented, leaky, or mashed. These figures represent the detailed examination of 6,000 dozen eggs before and after shipment, and the results of a general study of the condition of 71 carloads of over 500,000 dozen eggs shipped in car lots from 36 packing houses in the corn belt to 10 different markets on the Atlantic coast. They mean that New York City alone has a breakage of at least 116,000,000 eggs annually. The study was also extended to the question of whether the egg breakage was due principally to the jarring received in railroad cars or to carelessness on the part of the packers. Over 200 cases, or 6,000 dozen eggs, were separately examined at the packing house and the place of each egg in the case charted. As a result of this examination it was found that over 19 eggs to a case, or 5.34 per cent, were broken or had cracked shells before the eggs were loaded in the car. Between the casing of the eggs in the packing house and their delivery to the city merchant there was an additional breakage of over 5 eggs per case.

The number of eggs broken in transit, it is believed, could be greatly reduced if only sound, new cases were used, proper packing employed, a proper system of nailing on the covers followed, and an efficient method of stowing and bracing the cases in the car practiced. A study of egg cases has established exact facts as to thickness of the wood, and has shown that there is a right and a wrong way to drive every nail employed in putting the case together.

By sending out thousands of dozens of eggs packed in many cases and stowed in different ways in cars and then recording the condition of the eggs on their arrival after a long journey, the specialists have determined that a

cement-coated nail will hold better in an egg case than a smooth nail; that the use of less than 6 nails in closing the case greatly increases its chance of straining; and that nails driven in straight make the box much more rigid than nails carelessly driven at an angle. The experiment has also shown the most effective place to drive each nail. One of the most disastrous things that can happen to an egg case, aside from actually coming apart, is for the right angles at the corners to spring, with the result that the case loses its rigidity and the eggs are broken. The straight nail tends to prevent this far better than the nail carelessly driven which goes in at an angle and does not fully grip the wood.

The way in which the eggs are packed inside the crate is also very important. Many experiments have shown that the fillers, or little cardboard cells in which the eggs are put, must be new and strong and that the flats, or cardboard sheets placed at the bottom and top of each case and in between the layers of eggs must be springy and unbroken. There is, of course, a temptation to reuse these fillers and flats. In the case of the fillers, the little projections around the outside which keep the nearest line of eggs from coming into contact with the box are very important and in second-hand fillers these are apt to be bent, with the result that the eggs are not kept in place but shift about with the movement of the filler. Some of the fillers when once used are dampened and weakened by "leakers," with the result that each layer of little partitions, instead of being rigid and keeping the eggs in place, has weak points which permit individual eggs to mash against each other. Much of the breakage in transit is due, not to unusually rough handling by the railroads, but to neglect of these simple facts. Careless packing has resulted in such claims for damages and such controversies between egg shippers and railroads in the past that many of the railroads wished to give up handling case eggs. The investigations tended to establish the actual responsibility for breakage, with the result that relations between railroads and egg shippers are becoming more amicable.

To make their demonstrations in egg packing more practical, the experts with the car invite one or more of the shippers to send in a commercial shipment of eggs and the cases

and then help the local packers to place the eggs and nail up the cases according to the method which experience has shown gives the greatest safeguard against breakage in transit. At the same time the doctrine of precooling of eggs is combined with this packing work, because before the eggs are packed they are properly chilled in the car and all the operations are carried on where the air is held at a low temperature, so that the eggs will have less chance to deteriorate while they are actually being packed.

The quality buyer of the little towns as a general thing is far better informed than his neighbors as to modern methods of handling his eggs, though even he frequently picks up points in the demonstration car which mean dollars and cents to his business. The case-count buyer is commonly the man who most needs education. Many do not even know how to candle and grade eggs, and their operations, instead of being based on sound business principles, are largely in the nature of speculative experiments. They commonly do not conduct a steady business, but buy when they think they can make profits. They frequently guess wrong and sometimes stop buying just when profits are to be made. The attitude of one of them is fairly typical of many. This man regarded the commission men of the cities or the larger concentrators near home as a set of cheats who never returned just prices for the eggs he sent. The railroads, according to his statement, generally smashed the cases all to pieces and then refused to pay his claims for damages, on some such "fool" reason as the use of second-hand or old cases, second-hand flats or fillers, or the lack of proper packing. Strange to say, the quality buyer in this same town found no such difficulties in his way. His only trouble, he explained, was to get enough good eggs to supply the demand of the city commission men.

That the arrival of the car does mean monetary advantage to the poultry industry of the neighborhood is clearly evidenced by the fact that the railroads are very anxious to have the car run over their territory and favor its progress in every way. The progressive men of the different egg-shipping towns constantly petition that the car make side trips to them or visit their towns on its next swing. The State agricultural agencies cooperate in every way with the

car, frequently sending with the Federal demonstrators not merely their own egg-handling expert, but their poultry-raising expert as well, to combine with the work lectures and demonstrations on improving breeds of poultry and better handling of chickens so as to increase the egg yield. In some States the State poultry car with its exhibits of different breeds of poultry and models of poultry houses, poultry devices, charts, and reading matter on improved poultry

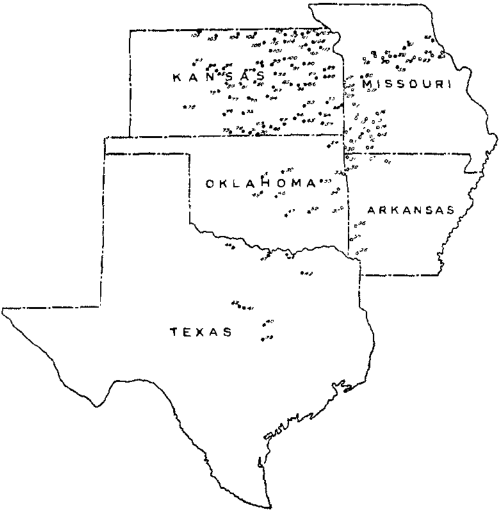


FIG. 21.—The egg car's record.

methods, goes along with "Uncle Sam's" egg-packing car. In many cases the day of the egg demonstration is made also an occasion for a stereopticon or other illustrated lecture on profitable chicken keeping.

In its 7,000-mile journey the car has already visited 117 different egg-shipping towns, and over 11,000 farmers, commission men, and school children (Pl. XXXIV) have gone up and down its wooden steps to see for themselves the advantages of the proper handling of the Nation's egg supply. (Fig. 21.)

ITINERARY OF THE EGG DEMONSTRATION CAR.

1. Butler, Mo., July 19, 1913.
2. Nevada, Mo., July 21, 1913.
3. Lamar, Mo., July 22, 1913.
4. Joplin, Mo., July 23, 1913.
5. Neosho, Mo., July 24, 1913.
6. Harrison, Ark., July 26, 1913.
7. Eureka Springs, Ark., July 27, 1913.
8. Cassville, Mo., July 28, 1913.
9. Pierce City, Mo., July 29, 1913.
10. Aurora, Mo., July 30, 1913.
11. Mt. Vernon, Mo., July 31, 1913.
12. Greenfield, Mo., Aug. 1, 1913.
13. Ash Grove, Mo., Aug. 2, 1913.
14. Springfield, Mo., Aug. 4 and 6, 1913.
15. Ozark, Mo., Aug. 5, 1913.
16. Bolivar, Mo., Aug. 7, 1913.
17. Clinton, Mo., Aug. 9, 1913.
18. Odessa, Mo., Aug. 16, 1913.
19. Marshall, Mo., Aug. 18, 1913.
20. Higginsville, Mo., Aug. 19, 1913.
21. Slater, Mo., Aug. 20, 1913.
22. Glasgow, Mo., Aug. 21, 1913.
23. Mexico, Mo., Aug. 22, 1913.
24. Bowling Green, Mo., Aug. 23, 1913.
25. Louisiana, Mo., Aug. 25, 1913.
26. Centralia, Mo., Aug. 26, 1913.
27. Drexel, Mo., Oct. 20, 1913.
28. Amoret, Mo., Oct. 21, 1913.
29. Hume, Mo., Oct. 22, 1913.
30. Anderson, Mo., Oct. 23, 1913.
31. Gravette, Ark., Oct. 24, 1913.
32. Siloam, Ark., Oct. 25, 1913.
33. Westville, Okla., Oct. 27, 1913.
34. Sallisaw, Okla., Oct. 28, 1913.
35. Poteau, Okla., Oct. 29, 1913.
36. Mena, Ark., Oct. 30, 1913.
37. De Queen, Ark., Oct. 31, 1913.
38. Ashdown, Ark., Nov. 1, 1913.
39. Temple, Tex., May 4, 1914.
40. Waco, Tex., May 5, 1914.
41. Hico, Tex., May 6, 1914.
42. Dublin, Tex., May 7, 1914.
43. Greenville, Tex., May 11, 1914.
44. Denison, Tex., May 12, 1914.
45. Gainesville, Tex., May 13, 1914.
46. Wichita Falls, Tex., May 14, 1914.
47. Ada, Okla., May 18, 1914.
48. Shawnee, Okla., May 19, 1914.
49. Oklahoma City, Okla., May 20, 1914.
50. Cushing, Okla., May 21, 1914.
51. Guthrie, Okla., May 22, 1914.
52. McAlester, Okla., May 25, 1914.
53. Muskogee, Okla., May 26, 1914.
54. Vinita, Okla., May 27, 1914.
55. Iola, Kans., May 28, 1914.
56. Emporia, Kans., May 29, 1914.
57. Parsons, Kans., June 1, 1914.
58. Ft. Scott, Kans., June 2, 1914.
59. Boonville, Mo., June 3, 1914.
60. Holden, Mo., June 4, 1914.
61. Moberly, Mo., June 5, 1914.
62. Hannibal, Mo., June 6, 1914.
63. Toronto, Kans., June 15, 1914.
64. Chanute, Kans., June 16, 1914.
65. Longton, Kans., June 17, 1914.
66. Howard, Kans., June 18, 1914.
67. Cambridge, Kans., June 19, 1914.
68. Oxford, Kans., June 19, 1914.
69. Wellington, Kans., June 22, 1914.
70. Caldwell, Kans., June 23, 1914.
71. Anthony, Kans., June 24, 1914.
72. Harper, Kans., June 25, 1914.
73. Kiowa, Kans., June 26, 1914.
74. Pratt, Kans., June 27, 1914.
75. Kingman, Kans., June 30, 1914.
76. Hutchinson, Kans., July 1, 1914.
77. Stafford, Kans., July 2, 1914.
78. Cimmaron, Kans., July 3, 1914.
79. Larned, Kans., July 6, 1914.
80. Great Bend, Kans., July 7, 1914.
81. Lyons, Kans., July 8, 1914.
82. McPherson, Kans., July 9, 1914.
83. Marion, Kans., July 10, 1914.
84. Newton, Kans., July 13, 1914.
85. Strong City, Kans., July 14, 1914.
86. Osage City, Kans., July 15, 1914.
87. Quenemo, Kans., July 16, 1914.
88. Ottawa, Kans., July 17, 1914.
89. Baldwin, Kans., July 18, 1914.
90. Alma, Kans., July 22, 1914.
91. White City, Kans., July 23, 1914.
92. Herington, Kans., July 24, 1914.
93. Wakeeny, Kans., July 27, 1914.
94. Hays, Kans., July 28, 1914.
95. Wilson, Kans., July 30, 1914.
96. Ellsworth, Kans., July 31, 1914.
97. Salina, Kans., Aug. 3, 1914.
98. Solomon, Kans., Aug. 4, 1914.
99. Abilene, Kans., Aug. 5, 1914.
100. Manhattan, Kans., Aug. 6, 1914.
101. Clay Center, Kans., Aug. 7, 1914.
102. Phillipsburg, Kans., Aug. 10, 1914.
103. Smith Center, Kans., Aug. 11, 1914.
104. Mankato, Kans., Aug. 12, 1914.
105. Belleville, Kans., Aug. 13, 1914.
106. Clyde, Kans., Aug. 14, 1914.
107. Holton, Kans., Aug. 17, 1914.
108. Horton, Kans., Aug. 18, 1914.
109. Hiawatha, Kans., Aug. 19, 1914.
110. Sabetha, Kans., Aug. 20, 1914.
111. Seneca, Kans., Aug. 21, 1914.
112. Axtell, Kans., Aug. 24, 1914.
113. Marysville, Kans., Aug. 25, 9114.
114. Blue Rapids, Kans., Aug. 26, 1914.
115. Greenleaf, Kans., Aug. 27, 1914.
116. Goff, Kans., Aug. 28, 1914.
117. Effingham, Kans., Aug. 29, 1914.

The success of the work is measured primarily by the reports of the egg collectors and the railroads that trouble with eggs is decreasing in the territory visited by the car. The demonstrators from time to time are also rewarded by the fact that some farmer and his wife will tell them that what they had learned was well worth the 10 or 15 mile drive to town, and that they intend to introduce the methods taught, so far as practicable, on their own farm. At one stop on the second trip of the car, a farmer broke into a conversation between a dealer and the demonstrator to say: "Well, I have been helping you considerable this year to get those first-quality eggs. You got it straight, young fellow. I sold off all my roosters a while back, and I gather the eggs twice a day, keep them in the coolest place I can find, and market two or three times a week. I'm getting now $1.25 a case more than before I did these things. What I have done hasn't cost me a cent, but it does take more time, and it's a heap more profitable, I'm glad to say."

The demonstrators, however, do not expect to bring about an egg millennium by one day's demonstration. They realize that much that they teach is new and that the carrying out of some of their directions involves departure from lifelong practices, and in many cases prejudices, on the part of the individual egg raiser and the individual egg shipper. One woman, convinced that infertile eggs would keep better and market better than fertile eggs, was nevertheless unwilling to get rid of the rooster in the flock because he was a prime favorite with the children. In time, however, the demonstrators believe that the argument of a few more cents added to the weekly spending money from the eggs will overcome such a sentiment. They understand clearly, though, that farmers will not take the trouble of eliminating roosters and grading their eggs and delivering them to town as fresh as possible unless the egg-buying merchants adopt the quality basis and make it worth the farmer's while to produce better eggs. The farmer is not in business for his health; his time is overfilled; his duties are many; his leisure limited; and the only argument that will make him introduce better methods on the farm is the fact that better methods pay.

MEAT PRODUCTION IN THE ARGENTINE AND ITS EFFECT UPON THE INDUSTRY IN THE UNITED STATES.

By A. D. Melvin, *Chief of the Bureau of Animal Industry*, and George M. Rommel, *Chief of the Animal Husbandry Division, Bureau of Animal Industry*.

PRODUCTION IN THE ARGENTINE.

THE growth of the meat trade in the Argentine Republic has been little short of remarkable, and its importance in the world's commerce is greatest in beef products. Although the exports of mutton from Argentina rose from less than 200,000 carcasses in 1884 to over 2,000,000 in 1895, they have grown rather slowly since that year, exceeding 3,000,000 in 1902 and reaching the high point of 3,679,587 carcasses in 1904. The maximum output of frozen mutton under present conditions seems to have been reached in Argentina. Up to the year 1913 the number of carcasses exported annually fluctuated from a little less to somewhat more than 3,000,000, and in 1912 there were fewer carcasses exported than in 1902. In 1913 fewer carcasses of frozen mutton were exported than in any year since 1896. Great Britain, the great consumer of meat exports from the Americas, gets only about 20 per cent of her mutton from Argentina. As the export mutton trade of the southern republic is therefore of somewhat minor importance at present, and as pork production is negligible, this paper will deal principally with the growth of the Argentine beef industry and its effects upon trade in the United States.

The area of the Argentine Republic is in round numbers 1,138,000 square miles. On this area there are 29,000,000 cattle, 80,000,000 sheep, and 3,000,000 hogs. Argentina ranks next to Australia in number of sheep, but is fourth in number of cattle, European Russia, the United States, and British India far outnumbering her in this respect. In the hog industry she is a negligible factor, hardly producing enough pork to supply her own small demands.

On this area of over one and one-eighth million square miles there are 25 cattle per square mile, very few of which are used for dairy purposes, and an average of 70 sheep per square mile, nearly all of which are used for wool production. The United States, on the other hand, has on its continental area of almost 3,000,000 square miles an average of only 19 cattle per square mile, and of these nearly two-fifths are classed by the statisticians as milch cows. As against Argentina's 70 sheep per square mile we have 17, but the mutton qualities are more strongly developed in our sheep than in those of Argentina. The United States has nearly 100,000,000 people to support on its 3,000,000 square miles of continental territory, while Argentina, with an area almost one-half as large, has less than one-tenth the population.

The beef exports from Argentina started in the year 1884, when 112 quarters of frozen beef were shipped. From then on the trade grew rather spasmodically until 1899, when exported frozen beef quarters jumped from 71,463 to 113,984. They passed the million mark in 1904 and the two-million mark in 1912. The year 1901 is notable in the Argentine beef trade, for in that year 24,919 quarters of chilled beef were exported. This trade has grown with only one setback (in 1908) until, in 1913, 2,989,805 quarters were exported, considerably more than the amount of 351,748,333 pounds of fresh beef exported by the United States in 1901, the year the Argentine chilled-beef trade began, and which year marked the beginning of the decline in United States exports of fresh beef.

The growth of the beef trade is shown in detail in the table following. The figures are from the Boletin Mensual, published by the Argentine ministry of agriculture.

Exports of beef from Argentina.

Year.	Frozen beef.		Chilled beef.		Total increase in beef over preceding year.
	Exported.	Increase over preceding year.	Exported.	Increase over preceding year.	
	Quarters.	*Quarters.*	*Quarters.*	*Quarters.*	*Quarters.*
1901	479,372	213,089	24,919	24,919	238,008
1902	735,715	256,313	94,498	69,579	325,922
1903	877,342	141,627	142,542	48,044	189,671
1904	1,018,072	140,730	198,300	55,758	196,488
1905	1,533,745	515,673	426,002	227,702	743,375
1906	1,580,589	46,844	455,459	29,457	76,301
1907	1,403,835	[1] 176,754	849,613	394,154	217,400
1908	1,579,163	175,328	789,348	[1] 60,265	115,063
1909	1,615,888	36,725	1,071,474	282,126	318,851
1910	1,434,078	[1] 181,810	1,608,608	537,134	355,324
1911	1,693,494	259,416	2,131,791	523,183	782,599
1912	2,086,780	393,286	2,269,474	137,683	530,969
1913	1,102,938	[1] 983,842	2,989,805	720,331	[1] 263,511

[1] Decrease.

These figures are particularly interesting from two standpoints. Except for two years (1907 and 1910) they show a constant increase in the quantity of frozen beef exported in spite of large increases in exports of chilled beef until the year 1913, when a drop of 983,842 quarters of frozen beef is noticed as against an increase of 720,331 of chilled quarters. This great change in 1913 doubtless indicates that Argentine exports will tend in the future to be confined to the chilled-beef class. For our purposes, however, the combined figures of frozen and chilled beef exports are much more important. Instead of an increase in volume, which is noticed in every year since 1901, the total exports of both frozen and chilled beef in 1913 show a decrease of 263,511 quarters below those of 1912. The figures for 1913 appear to indicate that slaughterings in Argentina are as great as present breeding stock will permit.

Argentine chilled beef normally sells on the English market within $1\frac{1}{2}$ to 2 cents a pound of the price of English beef, and Argentine frozen beef from $1\frac{3}{4}$ to $2\frac{1}{4}$ cents a pound lower than Argentine chilled.

The destination of nearly all of the Argentine beef is England, and Argentina is now the mainstay of the English beef market, as the following table shows. This table also shows the comparatively small influence of Argentine mutton in the English market:

Imports of meat into Great Britain.

[From Annual Statement of Trade of United Kingdom, etc.]

Year.	Source.	Beef, chilled.	Beef, frozen.	Mutton, frozen.
		Cwts.	*Cwts.*	*Cwts.*
1913	Argentina	5,216,022	1,955,853	1,012,347
	Other	31,982	398,840	4,191,960
1912	Argentina	3,871,140	2,723,757	1,589,200
	Other	5,310	226,120	3,269,500
1911	Argentina	3,753,140	2,357,878	1,782,066
	Other	177,528	93,477	3,430,829
1910	Argentina	2,710,747	2,188,122	1,419,653
	Other	477,968	159,521	3,841,970
1909	Argentina	1,826,612	2,381,543	1,437,375
	Other	832,567	157,921	3,130,572

ARGENTINE METHODS OF PRODUCTION.

Argentina is a vast grazing ground. Situated largely in tropical or subtropical latitudes, pasture is available during the entire year, and shelter is rarely used, except for high-class breeding and show animals. Wonderful fatness and bloom are obtained by the cattle on the grazing lands, and only when disease, droughts, or locusts come does the estanciero have much cause for worry. These visitations, however, are quite sufficient and doubtless tend to check the expansion of the industry. Until quite recently grain was fed only to show and breeding animals. At present some grain is being used for fattening market stock.

The droughts, of course, affect the crops more immediately than they do the animals which may depend upon them, and the Argentine farmer who is depending largely on his corn or wheat is hit harder by protracted droughts than is the cattleman. In an earlier paper [1] it has been observed that in Argentina cattle growing is a much more certain enter-

[1] A. D. Melvin. The South American Meat Industry. Yearbook of the U. S. Department of Agriculture, 1913, page 347. (See p. 358.)

prise than grain growing, and the people therefore prefer to raise cattle where the prices are remunerative, and that in 1913, on account of satisfactory cattle prices, there was a tendency to convert grain lands into alfalfa pastures.

The enormous use of alfalfa pasture for fattening cattle in Argentina can not be overlooked in any consideration of the industry in that country. With its wonderful resistance to drought, no plant seems to rival it for the purpose, and when prices are at a satisfactory level a country so well supplied as Argentina with alfalfa pasturage has an assured position in the trade. It appears that the rapid growth of the beef-cattle industry during the past 15 years has been coincident with the development of alfalfa for grazing purposes. Indeed, it may be said that the extensive seeding of alfalfa pastures by Argentine estancieros is what has made the expansion of the cattle industry possible.

Melvin also observed that alfalfa is not used nearly so much as it could be.[1] He naturally suggests that the extension of the use of alfalfa for grazing will depend on the maintenance of remunerative prices for cattle.

As shown in the table on page 383, the increase in the supply of breeding animals does not appear to be keeping pace with the slaughter of animals for beef, and Melvin[2] and others have called attention to the fact that Argentina is now slaughtering up to the limit of its present annual output. The sale and slaughter of females has been a matter of public investigation in Argentina, but it is believed that the high prices have checked this practice and are now tending to encourage breeding operations.

BREEDING METHODS.

Breeding methods in Argentina are on a high plane. Not even the United States, with its deserved excellent reputation for the perfection to which its beef herds have been brought, can surpass Argentina. In the United States it is the exception to find a splendid herd of beef cattle handed down from father to son. In Argentina it is so common as to be almost the rule. In fact, many establishments have

[1] Yearbook, U. S. Department of Agriculture, 1913, p. 358. [2] Ibid., p. 364.

been in the hands of the same family for nearly a century. Add to this tenacity of purpose and continuity of plan and policy the universal custom of buying the best individuals and the best blood regardless of price, and we can readily appreciate that an exceedingly high degree of excellence is found in the best Argentine herds. An Argentine breeder recently paid the record price for a bull to head his herd, and this willingness to pay well for good blood is reflected in the prices which ordinary range bulls command. In no country are such uniformly high prices paid for these animals.

EFFECT UPON THE INDUSTRY IN THE UNITED STATES.

At the outset, let us observe in some detail just what has happened to our export trade in fresh beef since 1901, the first year that exports of chilled beef were made from Argentina. This information appears in the following table:

Exports of fresh beef from the United States, fiscal years ended June 30—

Year.	Quantity.	Year.	Quantity.	Year.	Quantity.
	Pounds.		*Pounds.*		*Pounds.*
1901	351,748,333	1906	268,054,227	1911	42,510,731
1902	301,824,473	1907	281,651,502	1912	15,264,320
1903	254,795,963	1908	201,154,105	1913	7,362,388
1904	290,579,671	1909	122,952,671	1914	6,394,404
1905	236,486,568	1910	75,729,666		

Starting in 1901 with over 351,000,000 pounds, we note a drop of one-seventh, or 50,000,000 pounds, in 1902, a further decline of nearly the same amount in 1903, then a rebound, then a drop of 63,000,000 pounds, then another rebound and another, with 281,000,000 pounds exported in 1907, from which time our fresh beef exports have constantly fallen with marked rapidity until in 1914 less than 7,000,000 pounds were shipped. At the same time let us refer back to the table showing the growth of the Argentine trade. We see that as the Argentine chilled-beef trade has grown that of the United States has declined. The 351,000,000 pounds of fresh beef exported by the United States in 1901 represents about the same amount of chilled beef that was exported by Argentina in 1913. The 24,919 quarters of chilled beef exported by Argentina in 1901 equal about half the

amount of fresh beef exported by the United States in 1914. Argentina has therefore taken our place as the source of England's beef supply, not because she could produce beef more cheaply, for she always undersold our beef on the English market, but because she could produce the larger surplus. Our beef surplus has vanished and our own people now require all that our farms and ranches produce. It was not until this condition began to manifest itself in the United States that the enormous growth of the Argentine trade began. The most striking feature of the whole subject, the one on which all can agree, is not that meat production in the Argentine has had an effect upon the industry in the United States, but that the decline in the surplus production of beef in the United States has had a most profound effect on the industry in Argentina. The rapid increase of our population without a corresponding increase in our beef output demanded the beef which had formerly gone abroad, and this decline in our exports transferred the English demand to Argentina and gave Argentine producers the opportunity to furnish England the beef which she could no longer obtain from the United States.

We must not, however, pass lightly over this subject. The possible effect of Argentine production on our trade in future demands serious consideration. With our markets thrown open to meat and meat products from abroad, the following table is interesting. It shows by months the imports into the United States of these Argentine products from October, 1913, to September, 1914, inclusive, and covers a period of only a few days short of one year.

Imports of beef were highest in March, 1914, when somewhat over 20,000,000 pounds came in. The total amount of refrigerated beef imported from October, 1913, to September, 1914, was nearly 140,000,000 pounds, which was more than the amount of fresh chilled beef exported by the United States in 1909, but much less than half the amount which we exported in 1901. The total amount of all meat and meat food products imported from Argentina during this period was, in round numbers, 154,000,000 pounds. This, however, represents only 1½ pounds per capita out of a total per capita consumption of 150 pounds.

Imports of meat from Argentina to the United States, October, 1913, to September, 1914.

Month	Fresh and refrigerated meat.		Canned and cured meats.	Other meat food products.	Total.
	Beef.	Other.			
1913.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
October	2,069,794	....	....	46,070	2,115,864
November	3,988,898	10,204	31,025	63,709	4,093,836
December	9,440,488	237,422	130,176	546,588	10,354,674
1914.					
January	8,935,797	290,317	16,600	612,990	9,855,704
February	4,346,565	....	50,801	222,115	4,619,481
March	20,784,393	1,663,542	216,711	146,871	22,811,517
April	16,538,936	813,079	70,200	189,120	17,620,335
May	12,305,976	483,995	363,360	149,608	13,302,939
June	21,025,108	1,740,953	14,400	140,940	22,921,407
July	15,715,179	376,634	554,750	476,432	17,122,995
August	11,902,399	625,156	974,449	994,039	14,496,043
September	12,909,995	1,055,038	308,544	294,298	14,567,875
Total, 12 months	139,963,528	7,296,340	2,740,016	3,882,786	153,882,670

Apparently no one has been able to detect that this new trade has yet affected the industry here. Judging from the strong demand for pure-bred bulls, there is confidence among the producers of feeders that our home trade will not be seriously injured. We have seen that Argentina is slaughtering up to the limit of her capacity, and that, apparently, breeding operations are being extended in that country. Statistics seem to show plainly that to keep up with her increasing exports to Europe, Argentina is compelled to increase her breeding herds. With our own population increasing rapidly and our beef production apparently passing through a period of readjustment, definite forecasts of final results seem unwise. However, we do not believe that beef producers in the United States need have serious immediate concern regarding competition from Argentina.

THE BREEDING INDUSTRY.

Although the final effect of the beef output of Argentina may be difficult to forecast, there seems no doubt that a positive and beneficial effect upon our industry may be expected in the demand for breeding animals. Although the Argentine herds have been brought to a high standard, their

owners are constantly in the market for breeding animals to bring in fresh blood or to improve the quality of the herds. This trade has heretofore gone almost entirely to Great Britain, and it has been one of the most profitable outlets which British breeders have had. Every influence is used to maintain this dominance of the English breeder. The business and social relations between British and Argentine breeders are close. British judges nearly always officiate at the leading Argentine shows, and, in spite of the large numbers of young Argentines who have been educated at our agricultural colleges, British or continental authorities are usually consulted on live-stock subjects. So far as recollection goes, there is not an instance of a North American breeder having been asked to judge at an Argentine show. The junior author of this paper has suggested that an invitation be extended to some prominent Argentine breeder to officiate as a judge at one of our leading shows. Such a courtesy would be greatly appreciated and would have a profound effect on subsequent relations between Argentine breeders and those in the United States.

With the curtailment of breeding operations in England at present and natural interruptions to the trade, may we not expect Argentina to become interested in North American breeding stock? If we take some of their beef, why should they not take some of our bulls in exchange? The writers do not believe that we have many to spare, if indeed we have any that our pastures do not need; but we do believe that a reasonable amount of such trade with Argentina would be a great stimulus to breeders in the United States.

Our breeders of beef cattle have gone far toward developing distinct strains and families of marked merit. These families offer to Argentine breeders blood lines and valuable characteristics which can not be obtained in British herds. Without in any way detracting from the merits of British-bred animals, it is suggested that it would be to the advantage of Argentine breeders to mingle with their own well-established strains not only the best of the modern British blood lines but those of North America as well. As a striking and familiar example of the possibilities of such a course may be mentioned the Shorthorn bull Americus, which was grand champion at the Palermo show in 1913 and sold for 80,000

pesos ($34,400), the highest price ever paid for a bull of any breed. This bull's sire was bred in Argentina and his dam was bred by the Leonards at Boonville, Mo. Such facts have excited the interest of Argentine breeders, and this interest can be increased and made to yield tangible results if properly encouraged.

SUMMARY.

The foregoing remarks may be summarized as follows:

(I) BEEF PRODUCTION IN ARGENTINA.

(1) The growth of the Argentine export beef trade has been a remarkable development of the last 15 years.

(2) At present the Argentine beef output seems to be all that is warranted by the present supply of breeding animals.

(3) The Argentine beef output may be increased, the extent of the increase depending upon the maintenance of remunerative prices, the use of alfalfa pastures, and the relative importance of grain growing.

(4) Very little of the Argentine beef is corn-fed, and the large profit in raising cattle on alfalfa pasture when prices are satisfactory may in itself tend to check the growing of corn for fattening.

(5) Highly enlightened and long-continued breeding operations have given Argentina a stock of beef cattle of a very high degree of excellence.

(II) THE EFFECT UPON THE INDUSTRY IN THE UNITED STATES.

(1) The tremendous growth of the Argentine export beef trade may be directly attributed to the decline in the surplus production of beef in the United States.

(2) The United States imported from Argentina from October, 1913, to September, 1914, inclusive, in round numbers 154,000,000 pounds of beef and meat products, of which 140,000,000 pounds were refrigerated beef.

(3) The Bureau of Animal Industry does not believe that beef producers in the United States need have serious immediate concern regarding competition from Argentina.

(4) A positive and beneficial effect on our beef cattle industry may be expected in the demand for breeding animals from Argentina. This demand should be stimulated in every legitimate way.

HARD WHEATS WINNING THEIR WAY.

By Mark Alfred Carleton,
Cerealist in Charge of Cereal Investigations, Bureau of Plant Industry.

INTRODUCTION.

During the year 1870 a man named La Croix came to Minneapolis and constructed a wheat-flour purifier in one of the mills of that city. Such machines had been in use for several years in France, but until this time they were unknown in this country. By means of the purifier, which rapidly came into use, a complete separation of the milled products became possible, enabling the miller to produce from the strongly colored but nutritious middlings of hard wheat a flour suited in texture and color to the popular demand.

Eight years later, in 1878, Gov. C. C. Washburn, founder of the Washburn-Crosby series of flour mills, installed a small roller mill, claimed to be the first complete roller mill in the United States, and thus initiated, for this country, the most radical advance ever made in the history of milling. This mill was at first to be purely experimental. In fact, the new process was considered so uncertain for practical use that even during the same year, the Washburn A mill having been destroyed by an explosion of flour dust (May 2), the new mill erected in its place was fitted with stone burrs, as usual. At the close of 1877 the total runs of stone in the 21 Minneapolis mills were 197, and all the mills had water power but one, which was run by steam.

However, the use of rolls soon passed the experimental stage, and in a few years all plants in Minneapolis and all the principal mills elsewhere in the United States were roller mills. Rolls cause a crushing and flaking of the kernel instead of pulverization, as with stone burrs, and thus allow a more perfect separation of particles afterwards. They were at first made of various materials, chiefly porcelain, but finally the present perfectly formed steel rolls were adopted.

Upon these two innovations—the roll and the purifier—was based a new and complicated system of "high grind-

ing," which worked a complete revolution in the milling business. A tremendous increase in the business itself followed, because of greater efficiency in production, accompanied by cheapness of flour and increased consumption. The special significance of the new system in this connection is that the miller was enabled by its employment to operate successfully with hard wheats, which were destined to be the prevailing wheats in the prairie region.

ADAPTATION.

What are the conditions which made the cultivation of hard wheats inevitable in this country? Briefly these: They are the kinds of wheat best adapted to dry prairie regions, having come from such a region, the Chernozëm (black earth) in Russia, where they have long been established. They are therefore best suited to our own very similar prairie region, the Great Plains (Pl. XXXVI, fig. 1; Pl. XL, fig. 1), where they are now grown, and will give better yields there than other wheats.[1] With greater yield and the same price the farmer will naturally grow what pays him best—an axiomatic principle in any business. Although all hard wheats originally sold at a lower price than other wheats, the yield per acre of the former has almost always been sufficiently greater to more than offset the price discrimination. Later prices have become equal to or greater than those of other wheats. Add to these conditions the higher protein content of hard wheats, greater percentage of certain other nutritious constituents, and greater absorption of water by the flour, and we have ample reasons why these wheats must naturally prevail.

CLASSES.

Three classes of hard wheats have so far been introduced into this country (Pl. XXXV). These, in the order of their introduction, are (1) hard spring wheat, (2) hard winter wheat, and (3) durum wheat. Each has had an interesting history and has become established under difficulties. While each class has been a little more difficult than the preceding for the miller and baker to handle to their satisfaction, on the other hand these men have been better prepared each time

[1] A discussion of this matter in detail is given in an article, "Successful Wheat Growing in Semi-Arid Districts," in Yearbook for 1900, and in B. P. I. Bull. No. 3, "Macaroni Wheats," pp. 13-19, 1901.

to overcome the difficulties by improvements in machinery such as those already described.

HARD SPRING WHEAT.

Hard spring wheat, although introduced into the northern Great Plains of this country and Canada about the middle of the last century, did not become firmly established as a profitable crop until after 1870, coincident with the introduction of the purifier and roller mill. There are two chief varieties, Fife and Bluestem. The Fife was the first to be established. It is a little more hardy than the Bluestem and has a slightly harder kernel. The kernel is particularly distinguished by its greater breadth in proportion to length and by its very broad groove. The Fife has white bare chaff and the Bluestem white velvet chaff. Both varieties have red kernels and no beards (Pl. XXXV, figs. 1 and 2).

ORIGIN OF HARD SPRING WHEAT.

It is pretty generally agreed that Fife wheat came from the northern Volga River Valley district of Russia, but details of the introduction are lacking. Much credence is given to the following statement from the Canadian Agriculturist of 1861:

> About the year 1842, Mr. David Fife, of the township of Otonabee, Canada West, now Ontario, procured, through a friend in Glasgow, Scotland, a quantity of wheat which had been obtained from a cargo direct from Danzig. As it came to hand just before spring seed time, and not knowing whether it was a fall or spring variety, Mr. Fife concluded to sow a part of it that spring and wait for the result. It proved to be a fall wheat, as it never ripened, except three ears, which grew apparently from a single grain. These were preserved, and although sown the next year under unfavorable circumstances, being quite late and in a shady place, it proved at harvest to be entirely free from rust, when all wheat in the neighborhood was badly rusted. The produce of this was carefully preserved and from it sprung the variety of wheat known over Canada and the Northern States by the different names of Fife, Scotch, and Glasgow.

This traces the introduction no farther than Danzig, but it is very probable that the shipment was made from Russia.

OPPOSITION TO THE WHEAT.

Up to the year 1870 hard spring wheat was very unpopular, probably fully as much so as any other hard wheat has been, including the durum. Hard spring wheat sold at 10

to 15 cents less than soft spring and 20 to 25 cents less than soft winter wheat. As some writers put it, it was a "despised" wheat and considered quite unfit for making bread, particularly because of its strong color. Millers and bakers declined to receive it except at a considerable discount in price.

CHANGE IN SENTIMENT.

With the advent of the roll and the purifier there was an immediate change of sentiment. It was then possible to so handle the wheat as to produce a flour satisfactory in appearance to the consumer in comparison with soft winter-wheat flour. This was not accomplished at once, however. The new product persisted still in being a "creamy" flour, not white, and required considerable time to establish a reputation. It was seen, finally, that creaminess is really an indication of good quality. Others besides Washburn were pioneers in pushing spring-wheat flour to the front in these early days. Among these were George H. Christian; C. A. Pillsbury, founder of the present series of Pillsbury mills, including Pillsbury A, the largest mill in the world; and W. H. Dunwoody, an associate of Washburn.

GRADING AND PRICES AT CHICAGO.

For a long time there was no definite recognition of hard spring wheat. Spring wheat was any wheat spring sown, regardless of color or hardness.

At the Chicago Board of Trade, prices of the different grades at certain dates were as shown in the following table:

Prices per bushel of No. 1 spring, No. 1 red winter, and No. 1 white winter wheat on the Chicago Board of Trade on dates mentioned.

Date.	Price per bushel.		
	No. 1 spring.	No. 1 red winter.	No. 1 white winter.
	Cents.	*Cents.*	*Cents.*
Dec. 25, 1858 [1]	83 to 85	108 to 110	124 to 125
Dec. 21, 1861 [1]	68 to 70	74 to 76	85 to 86
Mar. 26, 1864	115½ to 116	140 to 145	....
Dec. 31, 1869	84 to 86	103 to 105	....

[1] Average prices for week ending on date given.

The grade of amber Iowa was adopted in 1862, said to be a spring wheat from Minnesota, northern Iowa, and northern Wisconsin, which sold at 3 to 4 cents higher than No. 1 spring. The grades of Nos. 1 and 2 northwestern spring began in 1873 and sold at 1 cent higher than Nos. 1 and 2 spring, and in 1876 at 3 to 5 cents higher. On September 1, 1877, these grades were changed to Nos. 1 and 2 hard spring. Later on, the grade No. 1 northern was adopted as the standard milling and contract grade of hard spring the same as in Minneapolis. December 30, 1911, No. 1 northern sold at $1.05 to $1.10 per bushel, while No. 2 red winter (contract soft winter grade) sold at 91¼ to 98½ cents, showing a complete reversal of attitude toward hard spring wheat.

On March 27, 1869, prices of flour per barrel were as follows:

White winter	$7.00 to $10.00
Red winter	6.50 to 7.75
Fancy brands spring extras	6.25 to 6.75
Fair to choice spring extras	5.00 to 5.75
Spring superfine	3.75 to 4.50

Seven years later, in 1876, spring patent flour first sold at a price above that of white winter.

GRADING AND PRICES AT MINNEAPOLIS.

The grades Nos. 1 and 2 hard spring were adopted by the Minneapolis Chamber of Commerce August 16, 1882, and sold at 5 cents above corresponding grades of ordinary spring called "regular." In 1885, the grades Nos. 1 and 2 northern were established, and No. 1 northern became thereafter the standard milling and contract grade. No. 1 hard, however, was retained as a grade for the best Fife wheat, though in recent years there is very little wheat to which this grade may properly be applied. About 7 years ago two more grades, Nos. 3 and 4 northern, were added.

GROWTH OF THE HARD SPRING-WHEAT INDUSTRY.

From 1878 onward hard spring-wheat cultivation and northwestern milling progressed with rapidity. New lands in the Dakotas and western Canada were occupied by the wheat farmer, and new mills were constantly being erected

in new settlements. The center of milling moved westward from New York to Minnesota, and Minneapolis succeeded Rochester as the "Flour City." Hard spring wheat had won its way (figs. 22 and 23). In 1878, when the first roller mill was built, the total output of flour of Minneapolis mills was 940,000 barrels. A large flour-export market was developed in Great Britain, and the first export was made in 1878, amounting to 109,183 barrels. In 1902 the export alone from Minneapolis was over 3,000,000 barrels, while the total output was over 16,000,000 barrels. In 1909 the total flour production in Minnesota was 22,737,404 barrels, and the

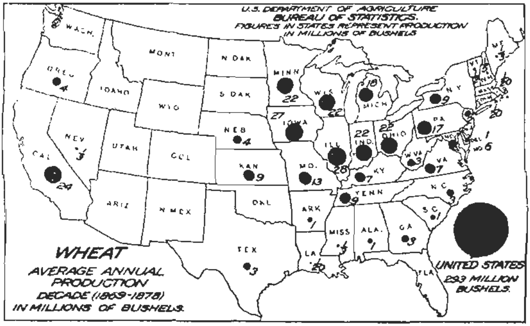


FIG. 22.—Average annual production of wheat in the United States, in millions of bushels, for the ten years from 1869 to 1878, inclusive.

same year the production of the three spring-wheat States, Minnesota, North Dakota, and South Dakota, was 25,531,610 barrels.

PRODUCTION AND GEOGRAPHIC LIMITS.

The area of hard spring-wheat cultivation at present includes the three States just mentioned, portions of Iowa, Nebraska, Illinois, and Wisconsin, and eastern Montana. Hard winter wheat has steadily encroached upon this area from the south, and in the Dakotas, especially, there is an extensive substitution of durum for hard spring wheat. The yearly production of hard spring wheat for the three States,

Minnesota, North Dakota, and South Dakota, from 1909 to 1914, inclusive, is shown in the following table:

Annual production of spring wheat in Minnesota, North Dakota, and South Dakota, in thousands of bushels, for the six years from 1909 to 1914.

State.	Production, in thousands of bushels.					
	1909	1910	1911	1912	1913	1914
Minnesota	54,284	61,376	42,441	64,704	66,348	41,010
North Dakota	97,606	32,224	62,074	125,936	68,553	71,133
South Dakota	31,215	31,489	11,396	37,842	24,440	23,876
Total	183,105	125,089	115,911	228,482	159,341	136,019

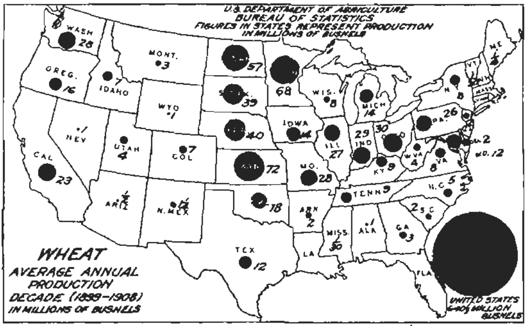


FIG. 23.—Average annual production of wheat in the United States, in millions of bushels, for the ten years from 1899 to 1908, inclusive.

The average production of these three chief spring-wheat States for the past six years was 157,993,000 bushels, exclusive of durum but including Preston (the so-called Velvet Chaff).

HARD WINTER WHEAT.

In this country the term "hard winter wheat" is applied chiefly to two closely related varieties or strains called Turkey and Kharkof. Other names, such as Crimean and Malakof, are often used for the same kind of wheat. The

characters are a medium-sized head, bearded, with white smooth chaff, and a hard red kernel, a little smaller than the usual winter-wheat kernel. There is little or no difference in visible characters between the Turkey and the Kharkof, but the kernel of the latter appears to be, as a rule, slightly larger and a little darker colored than that of the former. The gluten content of hard winter wheat is large, about equal to that of hard spring, but differs somewhat in quality. The expansive power or "strength" is slightly less in hard winter. There is also perhaps a trifle more color in hard winter-wheat bread.

ORIGINAL HOME.

The original home of hard winter wheat is in the area of Russia just north and east of the Black Sea and north of the Caucasus Mountains. The area includes chiefly the governments of Taurida (including the Crimea), Ekaterinoslav, Kharkof, and Stavropol, and the Don and Kuban territories. In that region the wheat is generally called simply winter wheat, but is known locally by various names as Krimka (Crimean), Kharkof, Beloglina, Ulta, Torgova, etc. (Pl. XXXV, fig. 3.) Our introductions from Russia are chiefly of the Crimean (the original Turkey) and Kharkof strains. In this country the area producing hard winter wheat, corresponding to the Russian area described above, is chiefly that portion of the Great Plains including Kansas, Oklahoma, small portions of Texas and Colorado, nearly all of Nebraska, and a small part of South Dakota.[1] The original home is strikingly similar in conditions of soil and climate to that portion of our Great Plains just mentioned (figs. 24 and 25).

KANSAS AND THE CRIMEA.

A traveler on the plains of Kansas, if suddenly transported while asleep to southern Russia and deposited in the Crimea, would discover very little difference in his surroundings, except as to the people and the character of farm improvements and live stock. Even these last would be of

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[1] In recent years Turkey and Kharkof have come to be successfully grown also in Iowa and in certain western intermountain districts, as Utah and Montana, which are not in the Great Plains proper. They are not adapted, however, to Pacific coast conditions.

the same kind if he were transported from certain localities in Kansas, where Russian immigrants now live. It is therefore natural that the center of hard winter-wheat production in this country should be in Kansas, since in Russia it is in the Crimea. The climate of the Russian district is a little more severe, which fact makes Crimean wheat all the more satisfactory for Kansas.

THE RUSSIAN MENNONITE PEOPLE.

The history of hard winter wheat is closely associated with the movement of Russian Mennonite immigrants to the middle Great Plains. These people originally went from west Prussia to southern Russia about 1770 because of certain land grants and civil privileges offered by the Government under Empress Catherine. One hundred years later their descendants, desiring further advantages to be obtained in America, emigrated to the middle Great Plains and settled principally in Kansas. The greater number were from the Molochna colonies in northern Taurida, but some were from the Crimea proper and others from Ekaterinoslav. The first settlements in Kansas were made in 1873 near Newton, Halstead, and Moundridge. Each family brought over a bushel or more of Crimean wheat for seed, and from this seed was grown the first crop of Kansas hard winter wheat. Bernard Warkentin, a miller, who erected mills at Newton and Halstead, was chiefly instrumental in introducing the Turkey wheat, but in this pioneer movement of the Mennonites two other men were associated—Christian Krehbiel, first a farmer, but who later, in 1886, erected a mill at Moundridge, and C. B. Schmidt, acting as immigration agent for the Santa Fe railroad.

HUMAN IMMIGRANTS AND CEREAL IMMIGRANTS.

There is an interesting feature of this introduction of a great crop in the fact that the crop and the people who knew best how to grow it migrated together. The Mennonites had been growing the wheat in its original home many years, although in the Molochna district spring wheat was grown up to 1860, when Turkey wheat was introduced there from the Crimea, and entirely replaced the spring wheat (Pl. XXXVII).

On account of the small rainfall in Taurida, an important feature of cultivation there is the "chernui par," or black fallow, called black simply from the very dark color of the rich turned-over soil. It is really a summer tillage, and there are four cultivations: First, a deep plowing, and then three lighter operations at intervals of a month afterwards, made by very

FIG. 24.—Distribution of hard wheats in Russia: (1) Hard spring wheat (chiefly variety Russian); (2) hard winter wheat (Crimean); (3) durum wheat (chiefly Kubanka).

small gang plows or cultivators. Therefore, these people, on coming to the Great Plains, were already acquainted with the practices of early deep plowing and thorough surface cultivation, which not until a quarter of a century later were widely advocated in this country in connection with "dry farming."

HEADS OF HARD WHEATS OF THE UNITED STATES.

[1 (Fife) and 2 (Bluestem) hard spring wheat; 3 (Turkey or Kharkof) hard winter wheat; 4 (Kubanka) durum wheat.]

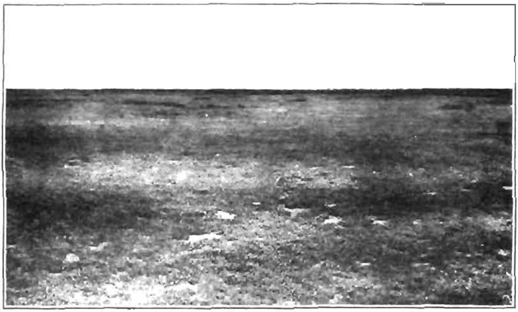


FIG. 1.—VIEW OF A PRAIRIE ON THE WESTERN GREAT PLAINS.

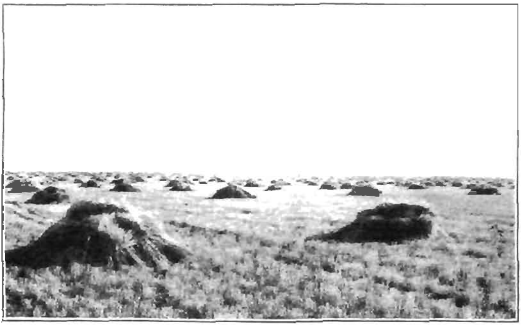


FIG. 2.—TURKEY WHEAT IN MONTANA, AVERAGING 35 BUSHELS PER ACRE.

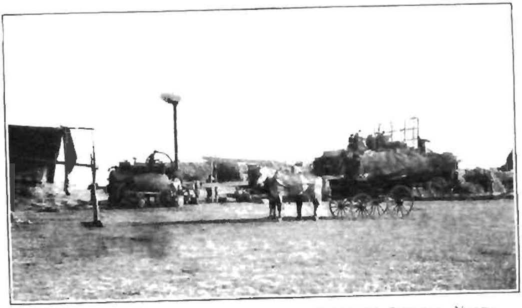


FIG. 1.—THRASHING TURKEY WHEAT IN THE MOLOCHNA DISTRICT, NORTHERN TAURIDA.

FIG. 2.—HARD WINTER-WHEAT FLOUR MILL AT SIMFEROPOL, CRIMEA.

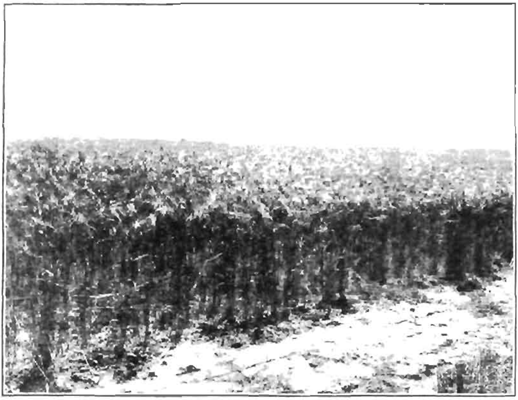


FIG. 1.—DURUM WHEAT UNDER "DRY FARMING" IN WYOMING.

FIG. 2.—ON LEFT, HARD SPRING-WHEAT FLOUR BREAD; ON RIGHT, DURUM-WHEAT FLOUR BREAD MADE AT THE SAME TIME IN THE SAME BAKERY.

MAKING HEADWAY SLOWLY.

The good qualities of Turkey wheat were not generally appreciated much before the close of the last century, 25 years after its introduction into Kansas by the Mennonites. At the Kansas experiment station its superiority came to light about 1897, though it had been under experiment for some time. Previously, Currell, or Zimmerman, had been the favorite wheat. In northwestern Kansas, Turkey was

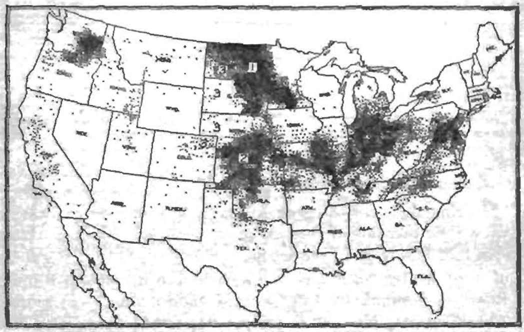


FIG. 25.—Distribution of hard winter wheat in the United States: (1) Hard spring wheat (chiefly Fife and Bluestem); (2) hard winter wheat (Turkey and Kharkof); (3) durum (Kubanka).

scarcely known even as late as 1890, though it had been grown already in scattering localities in that territory.

OPPOSITION.

The difficulties in milling and baking seemed to be a little greater than those met with in the hard spring wheat. Even Kansas millers for some time either declined to receive hard winter wheat or paid a lower price for it than for softer wheats. At Minneapolis, millers who had already had similar difficulties in milling hard spring wheat and would therefore know better than others how to handle it, nevertheless rejected it.

GRADING AND PRICES AT KANSAS CITY.

In 1875–76 the following grades were recognized at Kansas City: Nos. 1, 2, and 3 red winter, Nos. 2 and 3 white winter, and Nos. 1, 2, and 3 spring. December 1, 1879, No. 2 red winter sold for cash at $1.17, and No. 2 spring at $1. In 1880 winter and hard winter sold on the dates mentioned at the prices shown in the following table:

Prices per bushel of Nos. 1 and 2 winter and Nos. 1 and 2 hard winter wheat at Kansas City, Mo., on three dates in 1880.

Date.	Price per bushel.			
	No. 2 winter.	No. 3 winter.	No. 2 hard winter.	No. 3 hard winter.
	Cents.	*Cents.*	*Cents.*	*Cents.*
August 3	83½	74⅝ to 75	76	72
September 1	80	72¼	73	71
October 7	86	78¾	76½	76

During this year the grades Nos. 1, 2, 3, and 4 hard winter were first mentioned. In August, 1886, soft winter wheat still sold higher than red winter. June 30, 1891, the grades of hard winter were first included in the inspection report. Prices on September 3, 1892, were as follows: No. 2 soft winter, 70 to 71 cents; No. 2 hard winter, 65¾ to 66¾ cents; and No. 2 spring, 65 cents, showing hard winter still selling lower than soft winter, though there was now a large quantity of Turkey wheat grown. Out of a total of 70,218 cars received that year, 54,108 were hard winter wheat. Even 16 years later, in 1908, hard winter still sold at a discount, the price difference being from 3 to 7 cents on September 1 and from 1½ to 2 cents on December 1. In May, June, and July, 1910, it sold a little higher than red winter for the first time, but quickly fell again until April, 1911, and then again exceeded red winter to July 1, 1912. For December 15 to 21, inclusive, 1914, No. 2 hard winter ranged from $1.12 to $1.17¾, as against $1.11¾ to $1.17½ for No. 2 red winter.

CONDITIONS AT MINNEAPOLIS.

In 1891, 1,386,185 bushels of winter wheat were inspected at Minneapolis, the first considerable quantity mentioned, but how much, if any, of this was hard winter was not re-

ported. After this no further very large quantities of winter wheat were reported at that place until 1901, when 5,353,340 bushels were inspected. About 1905 hard winter wheat was received in Minneapolis with hesitation, and then in small lots. Separate grades of Nos. 1, 2, 3, and 4 for the hard winter wheat were first made in Minneapolis in 1907. On December 1, 1914, the price of No. 2 hard Montana (the same class of wheat) ranged from 2 cents above the same grade of northern spring to 1½ cents under, and 2 cents to 3½ cents under No. 1 northern. On December 22, the difference was 1 cent less or 1 to 1½ cents under No. 1 northern.

CONDITIONS AT NEW YORK CITY.

As early as 1901, hard winter wheat at New York was quoted at a fairly good price compared with No. 1 northern, and in 1902 the average price was only one-half cent below that of No. 1 northern. Afterwards it ran constantly several cents under in average yearly price, and under No. 2 red winter up to 1913, when it exceeded No. 1 northern by 1$\frac{9}{16}$ cents, but was still 4½ cents under No. 2 red winter. On December 19, 1914, No. 2 hard winter to arrive was quoted at $1.31½, 2 cents higher than No. 2 northern to arrive.

HARD WINTER WHEAT AT ST. LOUIS.

As St. Louis is situated in a soft or semihard wheat area, hard winter would not be expected to be popular there. Nevertheless it sold a little higher than red winter in 1911, then became lower again in 1912 and 1913. After long contention, No. 2 hard winter was admitted to contract grade in June, 1914. In 1913, the receipts of hard winter at St. Louis were almost equal to those of red winter for the first time. Recently (December, 1914) prices of the two grades have kept near together.

FINAL SUCCESS.

All recent prices at the important markets show a decided but gradual change in attitude toward hard winter wheat, so that it is now ranked, where it should be, among the first-class wheats. It has "won its way" through difficulties, in accordance with the motto of the State where its production is greatest.

In recent years hard winter wheat has been used in considerable quantity by Minnesota mills, while Kansas millers, who originally paid a lower price for it, long ago turned about and now will use no other wheat. In the meantime hard winter patent flour has gained a large export trade, is accepted everywhere, and has made Kansas the second flour-producing State of the Union. Kansas flour production in 1909 was 10,887,744 barrels.

Hard winter wheat is now more generally in favor in this country than any other winter wheat. In California, where it is not adapted, a third to a half of all wheat annually used by the mills is imported from the middle Great Plains. It has encroached upon the hard spring-wheat area to the northward in Iowa and Nebraska and upon the area of softer wheats to the westward in the Rocky Mountain States, and has made Montana a wheat State (Pl. XXXVI, fig. 2).

TURKEY WHEAT IN IOWA.

Turkey wheat has for a long time been grown in Iowa, and it has been claimed that it was introduced there from Illinois even before its introduction into Kansas. Whether this is true or not, it could well have happened, as the earliest Mennonite immigrants settled first in Illinois before 1870, and no doubt, as was their custom, brought seed of Turkey wheat to that State. There is a published statement that Turkey wheat was introduced from Mason County, Ill., into Iowa in 1870. It is also reported that George W. Franklin, of Atlantic, Iowa, first distributed this wheat in that State in 1886.

INTRODUCTION OF KHARKOF WHEAT.

The Kharkof strain of hard winter wheat was obtained by the writer, acting for the United States Department of Agriculture, in 1900, in Starobelsk district, eastern Kharkof government. This district is characterized climatically by great drought and piercing cold winter winds. It is much farther north than Taurida. Kharkof wheat has been able, therefore, to withstand the weather a little farther west and north than Turkey. It is particularly better for a combination of cold and drought. At about two-thirds of the

points where Kharkof has been accurately compared with Turkey for several years, it has given a little better average yield. At present about half the entire wheat crop of Kansas is of the Kharkof variety. For 1914, therefore, the Kansas production of Kharkof wheat alone should be about 80,000,000 bushels.

LATER IMPORTATIONS OF TURKEY WHEAT.

At the time of the introduction of Kharkof wheat several lots of Turkey or Crimean wheat were imported by the Department of Agriculture from the Molochna district of Taurida. A year later the Kansas Millers' Association, through Mr. Warkentin, imported 15,000 bushels of Turkey from central Taurida, which was sold as seed to farmers in Kansas and adjoining States, the source of seed being recommended to Mr. Warkentin by the writer. For a time this strain really appeared to give slightly better results than the usual Kansas seed, but in a few years its influence disappeared.

DURUM WHEAT.

Near the close of the last century the hard spring and hard winter wheats had become established in a large portion of the Great Plains region, from Canada southward to and including Oklahoma. In the continued progress of settlement westward, however, extremes of drought and combinations of cold and drought were encountered, which even these wheats, hardy as they were, could not always overcome. So much new land had been taken that settlements were being made up to and beyond the one hundredth meridian. There was, therefore, great demand for more drought-resistant crops for the newer semiarid districts, but especially for such crops as wheat, which would give cash returns to the new settler.

SHALL THE NORTHWESTERN PLAINS GROW WHEAT?

Briefly, out of the situation grew the question: Can wheat be grown profitably in the extreme western or semiarid portion of the Great Plains? As the hard winter wheat is a little more drought resistant than the hard spring, and as winter wheat always yields better than spring wheat, other

things being equal, the need appeared more urgent in the northern Plains States, making it desirable to secure a spring wheat able to resist more extreme conditions. It should be added that there was considerable commercial demand for more wheat. So many mills had been erected in response to previous extension of the wheat area, as described under "Hard spring wheat," and such deterioration in quantity and quality of the wheat crop had been reported, that there appeared to be a real lack of good wheat.

INTRODUCTION OF DURUM WHEAT.

It was therefore in response to a growing demand of both millers and farmers that the Department of Agriculture, in 1898 to 1900, attempted to increase and improve the wheat crop by the introduction of hardier varieties of still better quality from east and south Russia. From results of experiments previously conducted and after a careful comparative study of soil and climatic conditions, it was already suspected that new varieties from these districts would be of benefit in this country. While several good new strains of winter wheat were obtained, including the Kharkof already mentioned, the chief result of this work was the introduction of Kubanka durum wheat from the Kirghiz Steppe district of western Siberia, in the vicinity of Uralsk and Orenburg (Pl. XLI).

CHARACTERISTICS OF KUBANKA WHEAT.

The Kubanka variety, which represents practically all the durum wheat of this country, is a bearded wheat with compact, flattened heads, yellowish-white chaff, and large light-amber colored kernels, which are extremely hard and vitreous in fracture when of good quality (Pl. XXXV, fig. 4). The gluten content is very large, and there is also a large percentage of ash, oil, and sugar. Pererodka and perhaps Arnautka are other names for the same wheat. Beloturka also usually means the same thing, though in Russia it is claimed that this variety, when pure, is distinct from Kubanka, having longer and narrower heads. The varieties Gharnovka, Velvet Don (Chernouska), and Black Don (Chernokoloska) were also obtained from south Russia, but were soon found to be not so well adapted to our northern Plains.

ORIGINAL HOME.

The original home of Kubanka durum wheat is approximately Samara, Saratof, and Orenburg governments, Uralsk territory, and adjacent portions of the Kirghiz Steppe. The best quality comes from the Kirghiz Steppe district (Pl. XLI figs. 1 and 2), where the annual rainfall averages little more than 12 inches. The center of production is about in southern Samara and Uralsk territory (Pls. XXXIX and XL).

ADAPTATION IN THIS COUNTRY.

On the basis of similarity in climatic conditions, the center of production in this country would be logically in western North and South Dakota. Other conditions than climate, however, have had such influence that the trend of production has not always been in the logical direction. The greatest production, as a matter of fact, has been near the Red River, a long distance eastward from where it should be. There are probably two chief reasons for this fact, out of several that are possible: (1) Durum wheat is resistant to rust as well as drought, and rust occurs in greatest abundance eastward toward the Red River; (2) millers of the smaller western towns are either not able or not willing to adapt their mills to a new wheat, unless forced to do so by lack of other wheats. At present the center of durum-wheat production appears to be in Ransome and Sargent Counties, in southeastern North Dakota. No doubt, since durum-wheat prices have greatly increased, a greater extension of the crop westward will occur and the center of production will move westward (Pl. XXXVIII, fig. 1).

RUST RESISTANCE.

A quality of durum wheat of no little importance is its rust resistance. This fact was clearly brought out in the spring-wheat crop of 1904. There was a loss that year of 25,000,000 to 40,000,000 bushels in the crop of the three States of Minnesota, North Dakota, and South Dakota, practically all of which would have been avoided if the total crop had been durum. In many instances durum wheat made 15 to 20 bushels per acre, while Fife or Bluestem on the same farm was a total failure. One effect of this rust

epidemic upon the farmer was a very great increase in durum-wheat acreage the following year. Again in 1914 fields of Bluestem wheat were abandoned as not worth cutting in many localities in North Dakota because of rust. The new Marquis wheat fared little better; Preston wheat was still better, while Kubanka was apparently unaffected.

ESTABLISHING A NEW CROP.

Though durum wheat had been grown in small quantities at scattering points many years before its introduction by the Department of Agriculture, commercially it did not exist. The trifling quantity grown was sold for stock and poultry food at a price absurdly low for wheat. There was no financial incentive for growing it, and its good qualities were unknown. The task before the department, therefore, was far more than the mere introduction of Kubanka wheat seed. It was the long, tedious process of establishing a new crop, with all its attendant difficulties, a process of sheer persistence and education of the people.

DIFFICULTIES OF MILLING AND BAKING.

Changes of some kind in milling operations have accompanied the introductions of each group of hard wheat. Durum wheat has the hardest kernels of all. Even the modern roller mill would not handle it satisfactorily without some modifications, among which is a larger area of corrugated surface. The kernels must be softened much more by steam or water before being ground. After grinding, additional grades of bolting cloth are desirable for proper separation of the products. The closest grinding of durum gives a patent flour very sharp and gritty, with no pastiness.

In baking the flour absorbs more water, an advantage to the baker, and the loaf expands less and is heavier than in bakings of other flours. The excess of oil and ash imparts a stronger yellow color to the flour, and the excess of sugar causes a slightly sweet flavor (again to the advantage of the baker, as little or no sugar need be added) and a darker brown crust on the loaf. All these qualities are desirable to most people. However, yellow color and lack of expansion

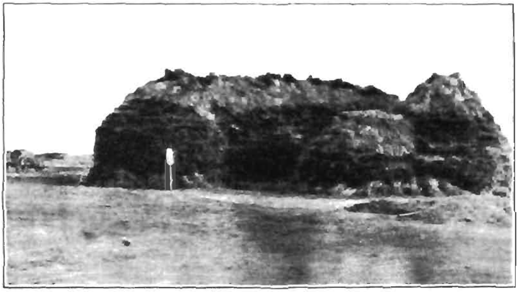


FIG. 1.—STACKS OF KUBANKA DURUM WHEAT NEAR URALSK, RUSSIA.

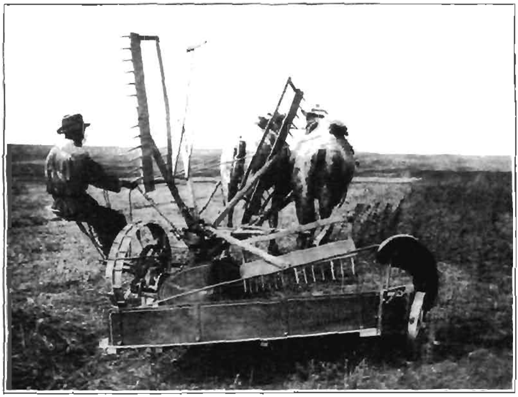


FIG. 2.—SELF-RAKE REAPER IN WESTERN SIBERIA.

FIG. 1.—HAULING DURUM WHEAT TO MARKET IN THE KIRGHIZ STEPPE, SHOWING ALSO THE CHARACTER OF THE COUNTRY.

FIG. 2.—DURUM WHEAT BROUGHT TO MARKET BY KIRGHIZ FARMERS AT URALSK, RUSSIA.

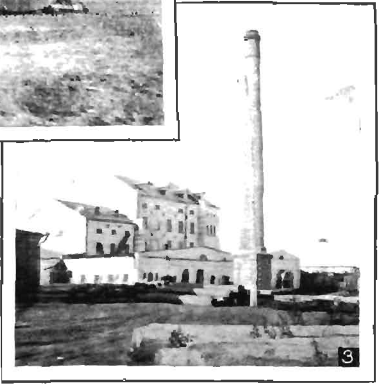


FIG. 1.—KIRGHIZ HUT, EAST SIDE OF THE URAL RIVER, IN SIBERIA. FIG. 2.—CAMP OF NATIVE KIRGHIZ HARVESTERS WHO CUT GRAIN WITH THE SICKLE. FIG. 3.—DURUM-WHEAT FLOUR MILL AT URALSK, RUSSIA. IN THE SAME MILL A BREAKFAST FOOD, "KASHA," IS MADE FROM PROSO MILLET.

have been the stumbling blocks to the baker and the housewife. It is still a matter of education of the eye and taste together and of dogged persistence on the part of certain enterprising millers and bakers, who will undoubtedly win their way in the end.

OPPOSITION TO DURUM WHEAT.

Naturally, durum, the hardest of hard wheats, met at once with the most violent opposition, chiefly from millers, but also from all grain men. Various epithets, such as "bastard" and "goose," were applied to the wheat without restriction. At first the tendency was to ridicule it, as it was not thought possible that such a wheat could prevail. However, a crop of somewhere near 10,000,000 bushels in 1903 and receipts of over 1,000,000 bushels at Duluth alone made it apparent that durum wheat was something to be reckoned with. The following is quoted from the report of the Duluth Board of Trade for the year ending December 31, 1903:

> This variety of wheat, new, yet not new, made this year its first appearance in this market in any considerable quantity—the receipts being 1,149,263 bushels. Prices range from 60 to 70 cents per bushel for No. 1. Opinions differ as to its future position in the grain market. * * * Millers do not seem to be very profuse in its praise.

For a time opposition seemed to increase, and the difference in price became greater. For 1903 the average price of durum at Duluth was 13½ cents under No. 1 northern; in 1904, 15 cents; in 1905, 16⅝ cents; and in 1906, 10 cents. Later the price difference became as much as 20 cents and more.

INCREASE IN PRODUCTION.

The production of durum wheat nevertheless increased greatly each year. In 1907 the farm value of the crop was about $30,000,000, or more than 3,000 times the original cost of introduction, and three times the entire appropriation for the Department of Agriculture for that fiscal year. The yield per acre became constantly 30 to 50 per cent greater than that of other wheat, on the same farm, and often 100 per cent greater in very dry localities. In the annual report of the Duluth Board of Trade for 1905 it was stated that durum wheat "has evidently come to stay, as evidenced by

the fact that 25 per cent of the wheat received at Duluth in 1905 was of this variety." The following more lengthy quotation from the 1906 report of the same board of trade gives a fair statement of the remarkable change in conditions respecting this wheat by the end of the year 1906:

The movement of durum wheat and the easy manner in which the large and sudden increase in its production has been absorbed have attracted the attention of the entire grain trade of the country. It was in the year 1903 that this variety of wheat made its appearance in the Northwest in any amount worthy of notice. It was not received with open arms. The American miller did not take to it, and to this day, the fourth year of its appearance in any volume, he still maintains his attitude of disfavor. With the American millers disposed against it, grain men naturally discouraged its production. The farmer, however, found that it grew easily and that it produced in more generous quantity than spring wheat, and its production increased. The year 1904 saw a somewhat larger amount grown, but it was in 1905 that the great increase came. So much greater was the volume of durum wheat that poured to market that grain merchants at the beginning of the movement of the crop despaired of ever finding a market for the yield. Good fortune was with the American grower, however, for the countries of Europe and in the Mediterranean district of Africa, which had always been large producers of this variety of grain, had reverses and were unable to supply those who had always looked to them for their hard macaroni wheat. The American exporter was quick to see the opportunity, and soon the foreigners were heavy buyers of durum wheat from America. Prices were advanced steadily, and the demand grew until there were times when durum wheat could actually be placed in some markets at better prices than No. 1 northern spring wheat. The entire crop was easily absorbed and at good prices.

But one result could be expected from this—another great increase in the crop of durum—and the year 1906 brought this. Again there was considerable uneasiness among grain merchants as to whether markets could be found for all of it. There was some fear that the buying of the 1905 crop by the Europeans had only been a temporary movement that would die out with the resumption of normal production by the macaroni-wheat raising countries of the other side. Nothing to justify this belief has as yet developed. The durum wheat crop of 1906 is being steadily absorbed, and the short sellers who looked for durum wheat to go to very low prices have been badly mistaken. Europe seems to have been well pleased with the wheat supplied by America from the 1905 crop and is again buying it heavily this year. Even Russia, one of the foremost wheat exporting countries of the world, has been a good buyer of this wheat in the Duluth market.

A further statement from the same source in the report for 1907 shows no abatement in the durum demand:

In the year 1907 durum wheat again made up a large percentage of the receipts of grain at Duluth, and it was in good demand. Foreign markets

continue to absorb the larger part of the shipments from here, but its use shows some sign of growing with American millers. Millers of the United Kingdom also use it to some extent when the price level is attractive. The crop of 1907 was much larger than that of the year previous, but the increased yield was absorbed without trouble.

A DECIDED CHANGE OF ATTITUDE.

As an interesting illustration of the great change in attitude toward durum wheat, the following two letters, quite opposite in sentiment, from a prominent grain-exporting firm to commercial journals, are here reproduced. The first was written to Bradstreet's in September, 1903, and from it the following is quoted:

There are arid portions of the Northwest where this wheat will grow and where ordinary wheat fails. It is not surprising that the farmers in these regions eagerly accepted the statement of Mr. Carleton that "goose" wheat (now under the name of macaroni) contained valuable qualities for bread-making—in fact, equal to that of our Scotch Fife. This theory exploited by Mr. Carleton has resulted in the raising of an enormous crop of this class of wheat, estimated at 10,000,000 bushels.

As indicated in the extracts from our Minneapolis letter, the millers view the situation with alarm. They are confronted with a large decrease in merchantable wheat, and also the danger of mixture of macaroni and other wheat, such mixture being useful only as food for stock.

From a shipper's standpoint this macaroni wheat must meet the competition in Liverpool of similar wheats from Russia, the Danube, and India. These at present are very low, and about 67 cents at Duluth is the best the exporter can pay for it. Last year's experience for the exporters of macaroni wheat was discouraging. They were encouraged to keep in the market through the fall, and were obliged to carry through the winter a block of macaroni wheat which failed to find a market. Its value as an export article is entirely independent of the price of other wheats. In view of this situation I think it is in good order to suggest that the Government exercise some caution in launching this variety of wheat and insisting that the millers and grain men meet the situation.

I heartily commend the Government for the establishment of its experimental stations and for the aid given the farmer in the development of proper seed grain, but I think Mr. Carleton's enthusiasm has warped his judgment. He has been instrumental in producing a condition of things in the Northwest that, to say the least, is unhealthy. The question of supply and demand, which Mr. Carleton has apparently ignored, must settle the question in value. I think the farmer should be advised to go slow in raising macaroni wheat until a safe market is found for it.

The second very different letter from the same firm was published in a Minneapolis journal in October, 1907 after

having been refused the columns of another well-known journal in the same city. It is quoted here as follows:

Just as a matter of interest, No. 1 durum wheat in Duluth sold to-day at $1 per bushel in store, and one durum wheat on track by sample is selling at $1.01 to $1.02. At the same time cash No. 2 red in Chicago can be bought at $1.03 in store at Chicago. Some of our export offers last night offered both the No. 1 durum and the No. 2 red Chicago at less than 3 cents per bushel difference, and the No. 1 durum is accepted and the Chicago No. 2 red not taken. Now, in view of this, and the fact that the buying is being done by English millers and German millers, and not by the Mediterranean macaroni trade, why not come out frankly and state that you have been unintentionally misrepresenting this wheat for some time, or that you have misjudged its milling qualities altogether. With the situation now, and the relative price between durum and red wheat for a milling mixture by a United Kingdom miller who can draw both, or draw any cheap wheat in the world, the plea that it is used because of its cheapness will not bear scrutiny. The fact is this durum wheat is a good yielder in the milling process. The percentage of off-grade is smaller than in a great many varieties of wheat. It makes a satisfactory body for a flour mixture, and it has a real value as a milling wheat, notwithstanding all that yourselves and other northwestern milling journals have said of it. In a large section of the Northwest it is the most profitable wheat to grow, and if the journals in the milling centers had treated this question from the start on a plain common-sense business basis, they would stand to-day in a better light in view of recent developments in the durum trade. We should like to see you frankly retrace your recent course regarding durum wheat.

DURUM AS A MILLING WHEAT.

In the Minneapolis letter referred to but not quoted in the above letter to Bradstreet's it is stated that durum wheat flour yields less bread per barrel. Quite the opposite result has been obtained in all bakings known to this department, and for a very simple reason—the greater water absorption of the durum flour. Note also the very different statement as to this question in the second letter: "The fact is this durum wheat is a good yielder in the milling process," etc.

As a matter of fact not one objection to durum wheat flour for bread making has been made good, except possibly the one of greater cost of production. This disadvantage is becoming constantly less, and will no doubt soon disappear as the miller becomes better acquainted with proper methods of operation. Even the yellow color, claimed to be so serious an objection, can be and has been eliminated by sufficient

aeration of the dough, which is made possible by the use of several mixers recently invented. However, this is only a suggestion to those desiring it. As a fact, the color should not be eliminated. It is the stamp of quality. The fact that northwestern spring patents, which are not white, have been established in the face of great opposition to their color is ample evidence that durum patents will also succeed (Pl. XXXVIII, fig. 2).

SEMOLINA AND MACARONI.

That durum-wheat semolina makes the best macaroni is a fact that probably needs no argument. We import chiefly from Italy, and the Italians use only durum wheat. Nevertheless, only a rather small percentage of macaroni is made from durum wheat in this country. Few Americans know what constitutes good macaroni. There is the ever-present idea again of whiteness, and when the color is good it is often spoiled by bleaching. It is then cooked into a pasty mass, wholly unlike the proper article, which should permanently hold its form, like rubber, although well cooked, and should be yellow or yellowish-white in color.

DURUM WHEAT AT DULUTH.

Durum wheat was first recognized commercially at Duluth. The grades of Nos. 1 and 2 durum were established there, at the board of trade, in 1902. Later, Nos. 3 and 4 were added. Much aid was given to the exploitation of durum, in the early days of its history, by exporters at this place. It also soon became a speculative wheat, equally so with spring. Durum sold readily as an export grain, as its qualities have long been known in Europe.

The first great increase in production was in 1905, following the rust epidemic of 1904, which brought out clearly the rust-resistant quality of durum. There was a good foreign demand ready for this surplus. In recent years Minneapolis and local mills have so far taken the crop that there is a constant scarcity for export. The receipts of durum, its percentage of the total wheat receipts, and comparative prices at Duluth for the first five years of its commercial history are shown in the table following.

Annual receipts of durum wheat, percentage of total wheat receipts, and prices of No. 1 durum and No. 1 northern wheat at Duluth, Minn., 1903–1907.

Year.	Durum wheat receipts.	Durum wheat in total receipts.	Price per bushel. No. 1 durum.	Price per bushel. No. 1 northern.
	Bushels.	*Per cent.*	*Cents.*	*Cents.*
1903	1,149,000	4.38	67$\frac{1}{2}$	81
1904	1,707,000	7.19	87$\frac{1}{2}$	102
1905	7,824,000	12.55	83$\frac{3}{4}$	100
1906	15,026,000	37.47	70$\frac{5}{8}$	80$\frac{5}{8}$
1907	26,721,000	48.07	80	97

The receipts of durum wheat, total wheat receipts, durum percentage of the total receipts, and average end-of-the-month prices for No. 1 durum and No. 1 northern at Duluth for 1908 to 1911 are shown in the following table:

Annual receipts of durum and of all wheat, percentage of durum wheat in total wheat receipts, and average prices of No. 1 durum and No. 1 spring at Duluth, Minn., 1908–1911.

Year.	Receipts. Durum.	Receipts. All wheat.	Durum wheat in total receipts.	Price per bushel. No. 1 durum.	Price per bushel. No. 1 northern.
	Bushels.	*Bushels.*	*Per cent.*	*Cents.*	*Cents.*
1908	22,631,000	46,873,000	53.90	90	107
1909	17,863,000	48,529,000	36.81	100	114
1910	8,831,000	27,841,000	31.72	90	110
1911	3,517,000	28,503,000	12.34	92	101

By 1907 almost half the total wheat received at Duluth was durum. Soon the low prices, as shown above, caused a decrease in acreage and also caused a larger quantity to be used by the mills. In 1911 even the durum that reached Duluth was reported to be practically all absorbed afterwards by Minnesota and other mills.

In 1910 it was evident that European millers were using our durum, as so much of it went to markets outside of France and Italy. Even British millers bought it. Antwerp offered one-half cent more for durum than for Manitoba No. 3.

On September 5, 1911, durum wheat at Duluth sold at a premium over No. 1 northern for the first time, the price being $1.04½ and for No. 1 northern $1.04⅜. Since then it has continued to be sold at a premium, at intervals, during three more crop years. Recently, for over two months (November and December, 1914, and onward) it has sold constantly above hard spring, often more than 20 cents above.

DURUM WHEAT AT MINNEAPOLIS.

Durum wheat for some time met with very conservative treatment by Minneapolis millers, as was expected, although its objectionable qualities were of the same nature as those met with in first handling spring wheat, but present to a greater degree, and therefore should have been considered evidence at once of its superiority.

After the first large durum crop, in 1905, following the rust epidemic, Minneapolis appeared to give more attention to the wheat, seeing that it had evidently come to stay. Also the great discrimination in price against durum, at that time increasing, and no doubt furthered by the very opposition to the wheat, now made it possible to use it in an experimental way, and it was soon admitted to be a very excellent milling wheat, if for no other purpose than blending with other softer wheats.

The grades of Nos. 1 and 2 macaroni appear to have been first recognized on the Minneapolis Exchange in 1902. In 1904, the term "durum (macaroni)" was adopted and grade No. 3 added. In 1905 the grades Nos. 1, 2, 3, and 4 durum were established. The first considerable quantity of durum wheat inspected into Minneapolis, nearly 7,000,000 bushels, was in 1906, and very little seems to have been inspected out. In that year a full report of inspection and prices of durum was first given by the board of trade. From that time onward the receipts steadily increased, up to 1910, when the quantity of durum received was over one-seventh of the total wheat receipts. By this time, also, the period of great price discrimination, which, however, had already lessened the production, was about ended. This fact, together with a stronger foreign demand, caused a sharp decrease in Minneapolis consumption. The receipts of hard spring wheat

and durum wheat at Minneapolis and the prices of each on December 1, for the years 1906 to 1913, inclusive, are given in the table following:

Receipts of hard spring and of durum wheat at Minneapolis, Minn., 1906–1913, with the price per bushel for each on December 1.

Year.	Receipts.		Price per bushel.	
	Hard spring.	Durum.	Hard spring.	Durum.
	Bushels.	*Bushels.*	*Cents.*	*Cents.*
1906	66,789,110	6,950,950	78¼	63½
1907	66,382,470	8,656,410	106	84½
1908	62,847,180	8,094,060	110½	89¾
1909	63,211,410	8,996,950	106	87¾
1910	71,619,960	12,929,790	106	88
1911	76,879,960	4,818,590	102¾	99
1912	101,213,460	5,140,010	82⅝	79¼
1913	98,903,080	5,284,480	85⅛	80⅞

Note that the price of durum jumped from a discount of 18 cents in 1910 to one of less than 4 cents in 1911, and, what is more important, has since been steadily maintained at an average of only 3 to 5 cents below that of spring wheat. At present (December, 1914) durum is selling as much above No. 1 hard as it was below it in 1909–10.

The two following items are from the Northwestern Miller:

November 18, 1914: Durum wheat on track at Minneapolis is commanding a premium of 6¾ to 8¾ cents per bushel over No. 1 northern.

December 2, 1914: Durum wheat sharply advanced in the last week on export inquiry from France to Italy. No. 1 durum on track at Minneapolis is held at 7⅝ to 10⅛ cents over No. 1 northern compared with ½ cent under to 2⅛ cents over a week ago.

On December 22, 1914, durum-wheat patent flour sold at 30 to 50 cents per barrel higher than hard spring patent, while durum semolina was still higher.

DURUM WHEAT AT NEW YORK.

New York early became an important durum-wheat point because of the European export demand. At first the shipments were almost wholly to France and Italy for use in making macaroni, but in recent years large quantities have gone to Belgium, Holland, Germany, Switzerland, and some

even to Great Britain, where the softest wheats are usually employed. There is sufficient evidence accompanying the reports of these facts to show that usually the wheat was ground for bread.

The following table shows comparative wheat prices at New York from 1901 to 1913, inclusive. Note that even the average yearly price of durum finally exceeded that of all other wheats except No. 2 red winter (the popular eastern wheat) in 1913.

Average yearly prices of various grades of wheat at New York, 1901-1913.

Year.	Price per bushel.				
	No. 2 red.	No. 1 northern.	No. 2 hard winter.	No. 1 hard Manitoba.	No. 1 durum.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*
1901	80 1/4	81 3/4	79 5/8	....	....
1902	83 3/16	82 7/8	82 3/8	....	....
1903	85 5/16	90 1/16	[1] 85 7/16	[2] 91 3/16	....
1904	110 11/16	112 1/2	102 11/16	....	....
1905	102 13/16	108 7/8	[3] 92 5/16	[4] 94 5/16	[1] 90 1/16
1906	86 1/2	89 5/8	85 7/8	88 11/16	83 5/16
1907	96 5/16	106 1/16	99 5/16	[5] 101 11/16	90 11/16
1908	104 7/8	116 5/8	109 11/16	[6] 113 15/16	101 3/4
1909	124 3/8	125 1/8	123 5/16	120 11/16	107 9/16
1910	111 13/16	121 5/16	[7] 110 5/8	111 1/8	103 5/16
1911	97 5/16	111 11/16	103 5/16	106 5/8	[2] 109 3/4
1912	109 1/8	112 7/8	108 7/8	110 1/2	[8] 105 9/16
1913	104 9/16	98 7/8	100 1/16	101 1/2	101 5/8

1 Average for 3 months, October to December, inclusive.
2 Average for 9 months, January to September, inclusive.
3 Average for 5 months, August to December, inclusive.
4 Average for 2 months, October to November, inclusive.
5 Average for 10 months, January to July, September to November, inclusive.
6 Average for 2 months, November to December, inclusive.
7 Average for 9 months, January and February, June to December, inclusive.
8 Average for 5 months, January, September to December, inclusive.

RECENT PRICES OF DURUM WHEAT.

For a long time the discouraging feature of durum-wheat production was the steadily decreasing comparative price. This continued, with variations, up to 1910. So long as the difference was not more than 3 to 5 cents, the greater yield of durum made it possible still to grow that wheat at a greater profit, where it was adapted, than other wheat. With a

price difference of 15 to 20 cents in 1908 to 1910, it was inevitable that the acreage should decrease. From 1911 conditions in this respect have entirely changed. Durum is now often the premium wheat and always sells near to No. 1 hard. At the time of this writing durum wheat has already sold at a premium as high as was ever reached by No. 1 hard over durum. A steadily increasing premium has been maintained for two months. Durum first reached the $1.50 mark at Philadelphia on December 17, 1914. On December 1, 1914, No. 1 durum sold at New York at $1.61 per bushel.

A PREDICTION FULFILLED.

During the week of September 19–25, 1898, the prices of Kubanka durum wheat at Samara, Russia, ranged from 17 to 23 cents per bushel above those of Russian, the latter a grade of spring wheat very similar to our No. 1 hard, and corresponding to it. This fact was personally observed by the writer of this article, who was in Samara during the time mentioned in search of good seed of durum wheat. In referring to this matter in another publication, the writer made the following statement:[1]

> It is interesting to note that just five years later almost an exact reverse of the relations in price of these two classes of wheat existed in this country at Minneapolis, and yet we have the same system of milling and largely the same export outlet for our wheat and flour as Russia. The explanation is that the American trade is only now becoming acquainted with durum wheat (Pl. XLI, fig. 3).

Later, in the years 1907 to 1910, when durum sold at 20 cents or more under No. 1 northern at Minneapolis, the writer, in discussing the conditions with grain men in that city at different times, made the prediction that in the future such conditions would be reversed and become similar to those at Samara, with durum wheat selling at a premium over No. 1 hard, and that the dealer who was first prepared and on the right side would reap the first profits. The idea was scouted as being hardly worth consideration. Several times in December, 1914, the prediction has been amply fulfilled, and the prices of durum and hard spring have finally stood in their proper relations, and as they were at Samara in September, 16 years ago.

[1] Carleton, M. A., The Commercial Status of Durum Wheat, U. S. Dept. Agr., Bureau of Plant Industry Bul. No. 70, pp. 12–13.

COOPERATIVE EFFORTS.

A number of business firms have aided greatly in establishing the durum wheat crop, while at the same time profiting by their operations. Perhaps the greatest aid was given by the actual opposition of its enemies, thereby cheapening the wheat so that tests of it on a large scale were financially possible. These tests were all that was necessary to bring it into favor.

THE FIXITY OF DURUM WHEAT.

In earlier years there was much doubt as to the permanency of the market for durum wheat until three large crops in succession were readily absorbed. So in 1911, when it first sold at a premium over hard spring, it was not believed by some that this could be anything more than a sporadic occurrence and that the former relation of prices between the two wheats, with its great margin against durum, would soon be resumed. But there was a second surprise, and the former relation was not again resumed, even in four years. On the contrary, the higher price of durum has become more and more frequent and finally the regular thing. Hence, even taking into full consideration the present disturbing conditions of foreign war, the chances are that durum will continue to be in great demand and will ever be in future a preferred wheat. This most triumphant career of a once rejected wheat is simply a good illustration of results that are bound to follow persistent efforts based upon facts of science.

AVERAGE TOTAL PRODUCTION OF THE HARD WHEATS.

It is impossible to determine accurately the total production of hard wheat, but it can be roughly estimated. The three Northwestern States produce about 180,000,000 bushels, including durum, each year. Other spring-wheat States produce about 15,000,000 bushels more of hard wheat, making 205,000,000 bushels of hard spring and durum. Kansas, Nebraska, and Oklahoma grow about 136,000,000 bushels, of which probably 120,000,000 are hard winter. This added gives 325,000,000 bushels. Other winter-wheat States, such as Iowa, Montana, etc., will furnish about 25,000,000 more, making in all 350,000,000 bushels as the approximate average annual hard-wheat production in this country. This is about half of the average total wheat production.

EXTENSION OF THE HARD WHEAT AREA.

As may be inferred from the preceding discussion, there are only two regions in the world where the strictly hard wheats may be successfully grown, these being the eastern and southern portions of Russia and the Great Plains and western intermountain districts of the United States and Canada. At the same time, only these wheats can be depended upon to give any profitable returns where the climate is extremely dry. Therefore, because of their excellent quality and the fact that they must be used in the extension of wheat growing into localities where the summers are drier and the winters colder than where wheat is at present grown, it is of vital importance for the future wheat supply to endeavor to improve them so that they will become adapted to localities at present still more unfavorable for wheat growing. For example, the hard winter wheat may be so improved in both winter hardiness and drought resistance that it can be grown farther north and west than the present Kharkof and Turkey varieties, while, on the other hand, the durum wheat may be so improved in drought resistance that it will be more successful in localities west of the one hundredth meridian.

MEAT PRODUCTION IN AUSTRALIA AND NEW ZEALAND.

By E. C. Joss,
Veterinary Inspector, Bureau of Animal Industry.

INTRODUCTORY.

EARLY in 1913 importations into the United States of frozen and canned meats from Australia and New Zealand began to show a marked increase. In past years the large surplus of mutton and beef produced in the Australian colonies has found its principal market in England, with smaller shipments going to continental Europe and the islands of the Pacific Ocean. However, with the steady increase in the population in the United States and at the same time the rather marked decrease in the number of beef cattle produced, especially during the past six years, it was inevitable that part of the world's surplus of meat, particularly beef, produced in the vast pastoral regions of South America and the Australasian countries should begin to seek North American markets.

In view of the volume of meat entering United States ports from Australia and New Zealand, the writer was directed by the Secretary of Agriculture late in the summer of 1913 to proceed to those countries and examine into the conditions under which the meat and meat food products intended for entry into the United States are produced, slaughtered, treated, and shipped.

Owing to the vast area of Australia, which is approximately equal to that of the United States, not including Alaska or the island possessions, it was possible to visit only the principal live-stock districts of the States of South Australia, Victoria, New South Wales, and Queensland lying to the eastward and bordering on the Pacific Ocean. However, in this portion of the continent are situated the principal cattle and sheep raising regions, and it is in this part of the Commonwealth that practically all of the Australian meat-export works are located. New Zealand, consisting mainly of two islands each approximately the size of the State of Iowa and situated about 1,200 miles to the east and south of Australia, was visited upon the conclusion of the observations made in Australia.

PRODUCTION OF LIVE STOCK.

The relative importance of Australia and New Zealand as sheep and cattle producing countries of the world will be noted in the following tables, showing the number of sheep and cattle of various countries. More detailed information on this subject can be found in the appendix to this volume.

Number of cattle in various countries.

Country.	Date.	Number.	Country.	Date.	Number.
British India	1911	114,876,000	Sweden	1911	2,690,000
United States	1913	56,527,000	Roumania	1911	2,667,000
Russian Empire	1910	51,404,000	Spain	1912	2,562,000
Argentina	1911	28,786,000	Denmark	1909	2,254,000
Germany	1912	20,182,000	Netherlands	1910	2,027,000
Austria-Hungary	1911	17,188,000	New Zealand	1910	2,020,000
France	1912	14,706,000	Bulgaria	1911	2,018,000
United Kingdom	1913	11,869,000	Belgium	1912	1,831,000
Australia	1912	11,577,000	Chile	1912	1,760,000
Uruguay	1908	8,193,000	Ceylon	1910	1,465,000
Canada	1913	6,656,000	Switzerland	1911	1,443,000
Italy	1908	6,199,000	Japan	1912	1,399,000
Mexico	1902	5,142,000	Algeria	1911	1,114,000
Cape Colony	1911	2,716,000	Norway	1907	1,393,000

Number of sheep in various countries.

Country.	Date.	Number.	Country.	Date.	Number.
Australia	1912	83,263,000	Italy	1908	11,163,000
Russian Empire	1910	80,500,000	British East Africa	1912	6,500,000
Argentina	1911	80,401,000	Roumania	1911	5,269,000
United States	1913	51,482,000	Chile	1912	4,169,000
British India	1911	31,691,000	Servia	1905	3,809,000
United Kingdom	1911	27,824,000	Mexico	1902	3,424,000
Uruguay	1908	26,286,000	Transvaal	1911	3,415,000
New Zealand	1913	24,192,000	Canada	1913	2,129,000
Cape Colony	1911	17,135,000	Natal	1911	1,519,000
France	1912	16,468,000	Norway	1907	1,393,000
Spain	1912	15,830,000	Sweden	1909	1,021,000
Austria-Hungary	1911	13,477,000			

Stock raising comprises the leading industry in both Australia and New Zealand, the former exceeding all other countries in the number of sheep and the amount of wool exported. Settled largely by thrifty English and Scotch emigrants during the past century, it naturally followed that

the painstaking and economical methods of animal husbandry and agriculture pursued in the parent country should be adopted and followed, so far as practicable, by the colonists of Australia and New Zealand. The best types of English and European breeds of sheep and cattle were early brought to the colonies. The results of these early importations, supplemented by later importations, formed the basis for the present flocks and herds. In fact, the breeding of sheep in these two countries has progressed along such sound, careful lines that other countries, recognizing the perfection of certain strains, are now importing Australian and New Zealand stud sheep.

Sheep raising is preeminent in both colonies, although Australia also produces a large quantity of beef for export. In Australia, where the production of wool rather than mutton has been in the past the chief aim of sheepmen, the Merino or fine-wool type of sheep predominates. In New Zealand considerable attention has been given to the breeding of sheep for meat production, with the result that trade reports show the Downs, Romney, Leicester, and Lincoln lamb carcasses of New Zealand are highly regarded in the European market for their excellent qualities.

The table below shows the stocks of domestic food animals in Australia and New Zealand from 1901 to 1912, the figures being those published in official reports of the respective countries:

Number of domestic food animals in Australia and New Zealand, 1901 to 1912.

Year.	Australia.			New Zealand.		
	Cattle.	*Sheep.*	*Swine.*	*Cattle.*	*Sheep.*	*Swine.*
1901	8,491,428	72,040,211	931,309	1,361,784	20,233,099	224,024
1902	7,062,742	53,668,347	777,289	1,460,663	20,342,727	193,740
1903	7,247,508	56,932,705	837,368	1,593,547	18,954,553	228,591
1904	7,840,520	65,823,918	1,062,703	1,736,850	18,280,806	255,320
1905	8,525,025	74,403,704	1,014,853	1,810,936	19,130,875	249,727
1906	9,349,409	83,687,655	813,569	1,851,750	20,108,471	242,273
1907	10,128,486	87,650,263	754,101	1,816,299	20,983,772	241,128
1908	10,547,679	87,043,266	695,669	1,773,326	22,449,053	245,092
1909	11,040,391	91,676,281	765,137	....	23,480,707	....
1910	11,744,714	92,047,015	1,025,850	2,020,171	24,269,620	348,754
1911	11,828,954	93,003,521	1,110,721	....	23,996,126	....
1912	11,577,259	83,263,686	845,255	....	23,750,153	....

In Australia the vast sloping highlands and plains country of the great interior of the continent, where the precipitation is sufficient to produce vegetation, is almost wholly devoted to live-stock grazing. The system mostly followed in the range country is to inclose in fence large holdings of land which are either privately owned or leased for a term of years from the Government. These ranches are known as cattle and sheep stations, and range in size from 5,000 to several million acres. Owing to the prevailing tropical and subtropical climate of Australia, open grazing on the indigenous grasses extends throughout the year in ordinary seasons. Practically no effort is made in these continuous-grazing districts to provide feed for periods when grass becomes deficient on account of drought, and devastating sectional or even general droughts are of not infrequent occurrence. These dry periods often seriously affect the live-stock industry by causing considerable losses of lambs and calves, and at times enormous losses of cattle and sheep. Thus, in the prolonged drought extending from 1898 to 1902 official reports show decreases in the number of sheep and cattle within the Commonwealth as follows:

Decrease of live stock in Australia owing to four years' drought.

	Number in country.		Decrease.	
	1898.	1902.	Total.	Per cent.
Sheep	79,000,000	54,000,000	25,000,000	31.63
Cattle	10,400,000	7,000,000	3,400,000	32.69

Following the droughts, however, the live-stock industry shows remarkable recuperative powers and a few favorable seasons usually suffice for a replenishment of the depleted flocks and herds. Thus, in the nine years following the 1898–1902 drought the number of sheep increased a little more than 38,000,000, while cattle increased not quite 5,000,000. Australia is poorly supplied with natural water courses, so that much dependence must be placed in ponds constructed to impound surface water or in bores or wells, which are often 3,000 feet or more in depth.

Although scarcely eight decades have passed since actual settlement began, New Zealand may now be considered one of the leading countries in the production of mutton, wool, and dairy products of good quality for export. The Government, recognizing the natural resources available for pastoral pursuits, has lent considerable encouragement and aid in developing the live-stock industry by fostering the raising of sheep and dairy cattle in the Dominion, by searching out and opening up new markets, granting subsidies to steamship companies carrying New Zealand products to foreign ports, etc. Sheep farming on a moderate scale is a leading agricultural pursuit in New Zealand; that is, small or large flocks of sheep are raised on a majority of the farms, on which the pastures are supplemented to a large degree by root crops, kale, rape, etc. The practice is quite common to finish fat lambs for market on succulent field crops, with the result that prime carcasses for export are produced.

The production of swine in both colonies is conducted largely as an adjunct to dairying, the combined annual stocks totaling less than 1,500,000 swine.

MARKETING OF LIVE STOCK.

The marketing of fat stock is conducted along much the same general lines in both countries. Buyers may go to the premises to make direct purchases of the producers, or the producers or owners may offer their holdings at public auction at salesyards located in various towns and districts. Such auction sales may be held at certain places on regular days each week, or announcements may be made in advance in the local newspapers. Live-stock sales are usually made at a lump price per head, or, in case of private sale, they may be made on the basis of the dressed weight of the carcass at the meat works. The practice of weighing live stock at the time of sale is not followed, it is said, except occasionally in the purchase of swine.

In Australia fairly large public salesyards are maintained in the cities of Sydney, Melbourne, Adelaide, and Brisbane for the purpose of marketing fat live stock. The Flemington cattle and sheep salesyards at Sydney, New South Wales, are the largest in Australasia. At these yards usually but two

sales days per week are held, the weekly receipts averaging about 5,000 cattle and 30,000 sheep. Swine salesyards are maintained in another part of the city, the weekly receipts averaging approximately 2,000 head. The system of marketing cattle, sheep, and swine in these large salesyards is to offer the live stock at public auction in pen lots or smaller groups, or even singly, as the live-stock agent sees fit. The tenders of purchase are made in lump sums per head, which renders the weighing of the animals unnecessary upon consummation of sale.

The custom of slaughtering on farmers' account is being followed to some extent in both countries, but more commonly in New Zealand. Under this method the slaughtering concern undertakes to receive cattle and sheep, to slaughter, freeze, and market the carcasses, and dispose of the skins, tallow, etc., for the farmer or owner, charging variable fees for the services rendered. Also several of the large meat-export works in New Zealand are owned and operated by cooperative associations of farmers or stock owners, by which plan such profits as may accrue in the conduct of the association are returned directly to the members whose live stock were slaughtered and marketed by the works. These cooperative concerns seem to be conducted along sound business lines and report making reasonable returns to live-stock owners during the past few years. An illustration of one of these cooperative establishments is seen in Plate XLII, figure 1.

TRANSPORTATION OF LIVE STOCK TO MEAT WORKS.

Although Australia has an area approximately equal to that of the main body of the United States, it has a little less than a total of 17,000 miles of railways, all owned by the Government. Railroad development has been confined mostly to the southeastern and eastern parts of the continent, thus leaving the vast interior and the western and northern parts of the country without connecting railroads. This means that sheep and cattle produced on the interior expanse of grazing land must be driven on foot to distant railway points for shipment or driven direct to the meat works, the latter being quite uniformly located on or near the Pacific coast between Adelaide, South Australia, on the south, and Townsville, Queensland, on the north. It is not uncommon

in Australia to hear of large droves of fat cattle which have been driven overland from 500 to 1,000 miles or more, subsisting without serious loss of weight on native grasses along the way, to reach a railway shipping point or meat works. Likewise, sheep from the far interior districts are often trailed hundreds of miles to reach market. Railway live-stock cars or trucks are much smaller as a rule and more open in general construction than American stock cars, some being arranged without roofs.

The two main islands of New Zealand, which virtually lie end to end and have a combined length of about 1,000 miles, sustain a total railway mileage of about 2,800 miles. As in Australia, all railroads are Government-owned. Owing to the New Zealand railroads being narrow gauge (3 ft. 6 in. between rails), the running equipment is of necessity light. The apparent inadequacy of the present railways precludes, practically, if such were desirable, the establishment of large central live-stock markets with associated slaughtering works. Instead, meat-export slaughtering works, usually one or two in each district, are located throughout the entire length of the eastern coast of both islands. The supplies of sheep and cattle for these meat works are usually obtained in the territory contiguous to the meat works located in that district. By arrangement, refrigerator steamships call at the various New Zealand ports where meat works are located to take on consignments of frozen meat, tallow, skins, etc., direct for British or European markets. From this it will be readily seen that railroad haulage does not enter to a large extent into the marketing of fat live stock or the shipment of meat in New Zealand.

LOCATION OF MEAT-EXPORT WORKS.

In Australia practically all of the meat-export works are located in the eastern and southeastern coastal regions. The principal slaughtering and shipping points are as follows: Adelaide, South Australia, exporting frozen lamb, mutton, and small amounts of beef and canned meats; Melbourne, Victoria, exporting frozen lamb, mutton, and some beef and canned meats; Sydney and Newcastle, New South Wales, exporting frozen lamb, mutton, and beef, canned meats, and meat extracts. More sheep are slaughtered at or near Sydney

and Newcastle, and more frozen mutton is exported through these ports, than from any other single State in Australia. Meat-export works in Queensland are located at or near the ports of Brisbane, Gladstone, Rockhampton, Bowen, and Townsville, and they supply more than one-half of the frozen beef exported from Australia. In addition, Queensland exports through these same ports considerable quantities of frozen mutton, canned meats, meat extracts, and tallow.

In New Zealand, with the exception of five or six meat-export works in the western part of North Island, all of the establishments for slaughtering and freezing meat for export are scattered along the east coast of both islands, extending from the northern to the southern extremities. The principal ports of export are Auckland, Gisborne, Napier, Wellington, Wanganui, and Waitara in North Island, and Nelson, Picton, Lyttleton, Timaru, Omaru, Dunedin, and Bluff in South Island.

TYPE OF MEAT-EXPORT WORKS.

In general, slaughtering departments of Australian and New Zealand meat-export works are confined to buildings of one or two stories in height. Slaughtering rooms as a rule are arranged with sufficient hanging space either in the room itself or in a well-ventilated room close by where freshly dressed carcasses of sheep and cattle are allowed to hang on rails for several hours for the purpose of cooling at atmospheric temperature. This space for cooling carcasses usually adjoins the freezing compartments in order that the carcasses when sufficiently cooled can be conveyed directly into the freezing rooms. The freezing and storage chambers are arranged along the general lines usual in such structures, being ordinarily divided into several large compartments, usually two stories in height, with freezing chambers above and compartments below for the storage of solidly frozen carcasses while awaiting shipment. Refrigerator capacity is usually provided to store from 20 to 30 days' slaughtering output. In Plate XLII, figure 2, is seen a view of a Queensland meat-export works, showing the Australian method of drying sheepskins in the sun on wire trellises.

In Australia, owing largely to the tropical and subtropical climate, the buildings used for meat works are as much as possible left open on the sides to permit free circulation of air.

These buildings are usually constructed with a framework of wood, with sides and roof covered with corrugated sheet iron. That part of the works, however, used for refrigerator purposes is usually constructed of wood or brick. Floors of slaughtering compartments are largely constructed of cement, asphalt, brick, or native hardwood. To secure an adequate supply of potable water for use at meat works seems to be a serious problem at many of the Australian works visited, as certain parts of Australia are deficient in natural watercourses and subterranean water can be reached only at great depths in some localities.

In New Zealand the better meat works are constructed of brick, a few of concrete, and others of wood. However, corrugated sheet iron is quite generally used for inclosing the sides of meat-works buildings and is used almost wholly for roofing purposes. Slaughtering floors are constructed of cement, asphalt, or brick. Louver windows to provide ample ventilation are provided in slaughtering rooms and in rooms used for the atmospheric cooling of fresh carcasses. New Zealand is bountifully supplied with clean, wholesome water, so that all meat works are excellently provided for in this respect.

MEAT-INSPECTION LAWS AND REGULATIONS.

AUSTRALIA.

Federal inspection of meat intended for exportation is provided by the Commonwealth commerce (trade descriptions) act of 1905 and is conducted under the direction of the minister of trades and customs, who is empowered to make rules and regulations governing the conduct of inspection. The federal comptroller general of customs, Mr. Stephen Mills, is the directing head of the Commonwealth meat-inspection service. The regulations and instructions issued by the department of trades and customs governing the inspection and exportation of meat and meat food products require an *ante-mortem* and *post-mortem* examination at the time of slaughter of all cattle, sheep, swine, and goats, the meat or products of which are intended for export shipment. Supervision is also extended to the preparation of canned meats, extracts, etc. Department officers are empowered to grade meat as to quality when offered for export and may reject all carcasses not considered in a fat prime condition or those

showing faulty dressing or other conditions objectionable to the trade. Fees for inspection are charged and collected by collectors of customs at the time the meat is exported as follows:.

Beef and veal	per carcass	3d.	(about 6 cents)
Pigs	per carcass	1d.	(about 2 cents)
Lambs, sheep, and goats	per carcass	¼d.	(about ½ cent)
Canned, preserved, piece, and other meat	per 100 lbs.	½d.	(about 1 cent)

NEW ZEALAND.

Under the "Slaughtering and inspection act of 1908" the Federal Government has provided for the inspection of all cattle, sheep, swine, and goats slaughtered for export, and for a similar inspection of all animals slaughtered for domestic consumption in municipalities of more than 2,000 inhabitants. The main features of the present law are:

(1) Federal inspection at all meat-export works.
(2) Federal inspection of meats for consumption in towns and cities of more than 2,000 people.
(3) Issuance of annual licenses for all slaughterhouses and meat-export works.
(4) Collecting fees from slaughterers to defray the cost of inspection.
(5) Remuneration for carcasses condemned.
(6) Government loans to municipalities to erect abattoirs.

Fees are charged by the Government in connection with the slaughter and inspection act as follows:

	£	s.	d.	
For registration of municipal abattoirs	5	0	0	(about $25.00)
Annual license to meat-export works	1	0	0	(about $5.00)
Annual license to slaughterhouse other than abattoirs aud meat-export works	0	10	0	(about $2.50)
Inspection fees:				
Cattle per head			4d.	(about 8 cents)
For every 12 or fraction of 12 calves, pigs, or sheep			3d.	(about 6 cents)

The meat inspection of New Zealand is administered by the live stock and meat division of the department of agriculture, industries, and commerce, the chief of the service being a veterinarian, Dr. C. J. Reakes.

TRANSPORTATION OF EXPORT MEAT.

Although the meat-export works of Australia and New Zealand are located at or near the ports of export, few of the works are arranged so that frozen meat can be loaded

directly from the establishment into the ship's hold. Frozen meat is usually conveyed from the meat works or cold-storage plants to the ship's side by wagon, motor truck, insulated railway cars, or barges. It is then transferred into the hold of the vessel, and with as little delay as possible packed tightly into the refrigerator compartments. It was stated that the frozen meat is carried at a temperature ranging from 10° to 15° F. during the oversea voyage. While there is a large fleet of freighters conveying frozen-meat cargoes from Australasian ports to the United Kingdom, continental Europe, and the Far East, there are but three steamship lines equipped with refrigerator compartments operating between Australia and New Zealand and the Pacific coast of North America.

Steamships equipped with refrigeration plying between Australia and New Zealand and United States and Canada.

Name.	Route.	Steamers.	Refrigerator capacity.
			Pounds.
Oceanic Steamship Co. (San Francisco).	San Francisco and Sydney	Sonoma	400,000
		Ventura	400,000
Union Steamship Co. (Dunedin, New Zealand).	Sydney, Wellington, and San Francisco.	Tahiti	700,000
		Aurangi	250,000
		Moana	360,000
Royal Mail Line (Dunedin, New Zealand).	Auckland, Sydney, and Vancouver, British Columbia.	Niagara	1,456,000
		Makura	1,164,000
		Marama	1,164,000

Freight rates on frozen meats from Sydney, Wellington, or Auckland to San Francisco or Vancouver, British Columbia, at the time of the writer's visit, were ¾d. (about 1½ cents) per pound. Freight rates from Australia and New Zealand to London were quoted as follows:

Frozen beef in quarters or primal parts..per pound.. $\frac{9}{16}$d. (about 1⅛ cents)
Frozen sheep carcasses..................per pound.. ⅝d. (about 1¼ cents)

EXPORT MEAT TRADE OF AUSTRALIA AND NEW ZEALAND.

The following statements, compiled from official reports, show the extent of the export trade of Australia and New Zealand in food animals and meat. The first statement gives the annual totals for each item since 1901. In order to convey an idea as to the destination of these exports the

second statement is presented, which gives the distribution of the meat exports from Australia for 1913. The distribution for New Zealand is not given because practically the entire trade of that country in meat is confined to the United Kingdom.

Australia's beef exports have increased rapidly in recent years, and while the United Kingdom gets the bulk of the trade, considerable shipments are widely distributed among other places, and there is at present a prospect of large dealings with the Pacific ports of the United States. Australian mutton is quite widely distributed also, although to a less extent than the beef.

Exports of domestic food animals and meat from Australia and New Zealand, 1901 to 1913.

AUSTRALIA.

Year.	Cattle.	Sheep.	Swine.	Beef.	Mutton and lamb.	Pork.	Bacon and ham.	Canned meat.
	No.	*No.*	*No.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1901.....	2,413	12,004	164	90,706,344	54,175,093	313,824	285,247	25,882,526
1902.....	4,489	24,296	31	79,453,248	44,105,600	647,920	187,739	21,989,644
1903.....	939	16,111	77	61,173,530	35,753,124	277,310	223,930	11,009,277
1904.....	770	7,746	247	37,090,945	47,863,532	420,783	369,083	15,702,031
1905.....	1,280	12,090	322	43,525,086	86,858,344	2,824,016	484,616	13,454,545
1906.....	552	17,979	220	41,561,252	90,692,385	3,472,224	530,459	9,060,903
1907.....	687	11,290	185	52,050,592	109,227,757	1,446,758	415,251	8,208,711
1908.....	953	13,019	117	40,711,516	91,607,614	826,102	389,718	12,383,939
1909.....	975	5,315	229	71,142,295	116,915,639	394,559	396,342	23,301,198
1910.....	3,745	13,144	303	109,427,528	190,229,330	741,410	1,604,362	34,053,451
1911.....	9,964	24,198	385	108,786,417	129,569,295	1,641,013	2,338,299	40,768,074
1912.....	16,083	34,101	609	142,210,076	115,371,981	897,929	2,172,880	34,161,615
1913.....	15,118	41,759	440	218,918,606	204,931,783	215,175	1,846,966	52,124,461

NEW ZEALAND.

Year.	Cattle.	Sheep.	Swine.	Beef.	Mutton and lamb.	Pork.	Bacon and ham.	Canned meat.
1901.....	290	3,668	75	25,614,176	167,902,784	477,680	616,000	3,948,896
1902.....	3,062	48,047	320	33,006,624	191,378,656	469,516	661,920	6,078,352
1903.....	366	21,047	266	23,812,320	228,424,000	370,384	422,152	4,216,800
1904.....	480	7,430	323	20,116,992	182,157,472	396,704	187,152	2,552,226
1905.....	595	11,729	288	17,417,904	162,841,392	290,752	140,224	3,186,368
1906.....	477	13,324	254	29,187,648	187,600,448	583,184	142,016	4,501,504
1907.....	322	13,762	248	41,399,680	208,862,192	793,632	171,804	5,290,728
1908.....	183	6,136	271	40,108,208	186,991,840	172,480	221,998	3,619,952
1909.....	299	6,967	630	56,011,872	222,726,000	137,536	152,668	6,546,400
1910.....	227	6,335	729	58,390,080	227,865,344	1,232,784	198,738	7,002,240
1911.....	371	7,909	696	28,438,592	211,595,216	1,223,376	227,920	6,393,536
1912.....	379	6,475	510	31,716,496	248,569,104	128,352	281,892	4,871,116
1913.....	275	11,803	198	31,404,016	246,362,928	294,928	114,240	4,094,048

FIG. 1.—A NEW ZEALAND COOPERATIVE MEAT-FREEZING PLANT OWNED BY FARMERS.

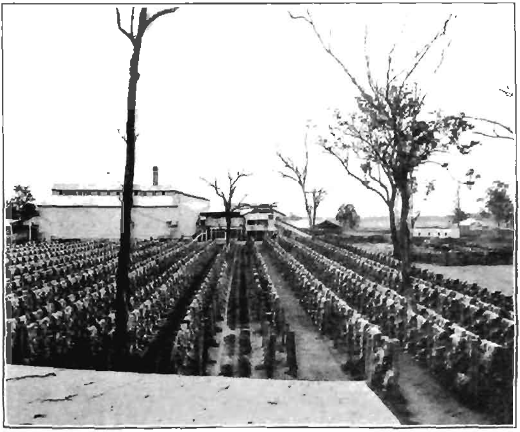


FIG. 2.—A QUEENSLAND MEAT-EXPORT WORKS, SHOWING METHOD OF DRYING SHEEPSKINS.

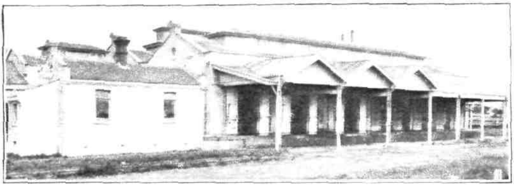


FIG. 1.—MUNICIPAL ABATTOIR AT AUCKLAND, NEW ZEALAND.
[Side view, showing railroad loading platform.]

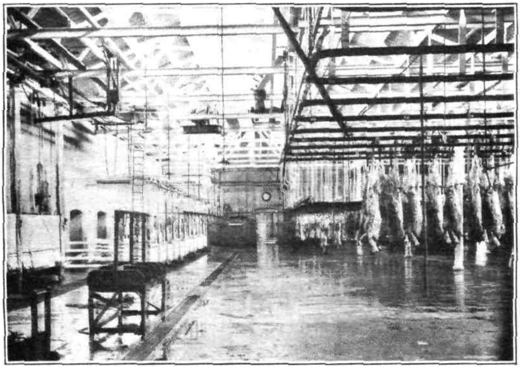


FIG. 2.—CATTLE AND SHEEP SLAUGHTERING ROOM, MUNICIPAL ABATTOIR, AUCKLAND, NEW ZEALAND.

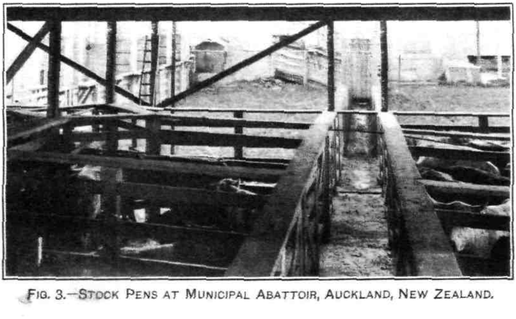


FIG. 3.—STOCK PENS AT MUNICIPAL ABATTOIR, AUCKLAND, NEW ZEALAND.

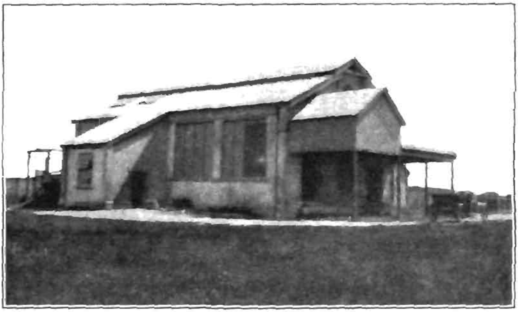


FIG. 1.—A MUNICIPAL ABATTOIR IN A SMALL NEW ZEALAND CITY.

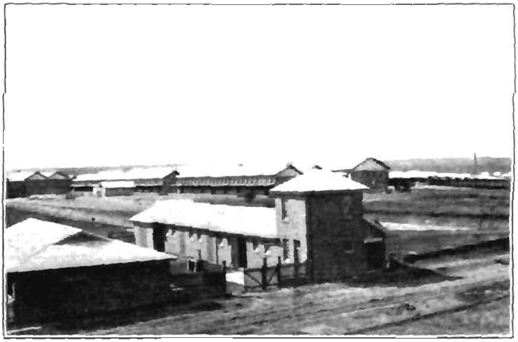


FIG. 2.—GENERAL VIEW OF THE NEW STATE ABATTOIR AT SYDNEY, AUSTRALIA.

FIG. 1.—CORRIEDALE EWE HOGGETS, ABOUT 15 MONTHS OLD.

FIG. 2.—CORRIEDALE EWE HOGGET, ABOUT 15 MONTHS OLD, WITH LAMB.

The beef trade of New Zealand is small compared with that of Australia. It is remarkable, however, that whereas New Zealand has only about one-fourth as many sheep as Australia, the exports of mutton and lamb are in most years more than twice as large as those of the latter country. This trade is, in fact, now so highly developed in New Zealand that the number of carcasses annually shipped to England represent fully 25 per cent of the entire flocks of the Dominion.

Distribution of meat exports from Australia during 1913.

Country to which exported.	Beef.	Mutton and lamb.	Pork.	Bacon and ham.	Canned meat.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
United Kingdom	169,963,291	191,440,138	11,877	731,189	41,121,014
Italy	6,356,514	44,854			
France	349,418	51,238			924,804
Germany	1,813,799	5,144,062			105,000
Canada	3,352,675	1,062,910			215,820
United States	5,037,769	571,008			1,891,114
South African Union	5,656,346	1,550,257			1,599,119
Egypt	3,990,804	633,109	23,780		
Malta	1,142,092				
Philippine Islands	14,535,447	778,693	93,507	475,154	237,920
Hawaii	2,356,115	91,085			30,728
Japan	36,705	39			
Hongkong	423,059	401,380		60,305	106,836
China				54,523	202,186
Other countries	3,903,972	2,563,010	86,011	525,795	5,631,720
Total	218,918,606	204,931,783	215,175	1,846,966	52,124,401

In addition to the exportation of meat products of domestic food animals, Australia exports annually from 15,000,000 to 20,000,000 frozen rabbits and hares, and New Zealand furnishes for export annually between 2,000,000 and 4,000,000. The shipment of rabbit skins to Europe is also an important item in the export trade of the two countries.

PUBLIC ABATTOIRS.

An especially commendable feature in the domestic meat trade of Australia and New Zealand is the rather general operation of municipal and State-owned abattoirs. The people of Australasia are perhaps the greatest meat con-

sumers per capita of all civilized countries, and no little interest is displayed by the general public in the production of the meat offered for domestic consumption. In most places the public abattoir is regarded as a necessity both from the standpoint of public health and community economy.

The people of New Zealand have been especially progressive in the enactment of laws dealing with municipal-owned slaughterhouses. A Government statute passed a few years ago provides that when a municipality attains a population of 2,000 it shall within a specified time establish an abattoir for public use wherein all local slaughtering shall be conducted. It is also provided that all such municipal-owned abattoirs shall conform to the requirements of the Government with respect to location, construction, arrangement, water supply, drainage, etc., and that federal inspection shall be inaugurated in all such establishments, the cost of the inspection to the New Zealand Government being recovered in fixed fees charged slaughterers by the municipality. By this arrangement it will be observed that while it is incumbent on the municipal authorities of towns of more than 2,000 inhabitants to establish and operate public abattoirs for their respective cities, the sanitary control of all such abattoirs and the conduct of meat inspection rests wholly with the Federal authorities, which at once suggests the highest possible protection to human health as regards unsound or unfit meat. The municipal abattoirs visited in New Zealand were uniformly of sound sanitary construction and well ordered throughout. The largest municipal abattoirs in the Dominion are those at Auckland (see Plate XLIII) and Dunedin. The number of animals slaughtered monthly at those places was given as follows: Auckland, 1,500 cattle, 8,000 sheep, 1,000 swine; Dunedin, 1,000 cattle, 10,000 sheep, 300 swine.

The Auckland abattoir is stated to have cost, for the land (26 acres), buildings, etc., including residence of manager, approximately £40,000 ($200,000). A smaller abattoir is shown in Plate XLIV, figure 1.

Australia has no commonwealth law requiring the establishment of public abattoirs. However, most of the individual States have enacted statutes dealing with the estab-

lishment of municipal or State-owned abattoirs. Large public abattoirs owned and operated by the State of New South Wales have been maintained on Glebe Island at Sydney for the past 50 years or more. These works have been extended from time to time as necessity demanded until now their average daily slaughtering capacity is as follows: Cattle, 1,500; calves, 500; sheep, 3,000; swine, 600.

About four years ago the State of New South Wales began the erection of entirely new abattoirs at Homebush Bay, a suburb of Sydney (see Plate XLIV, fig. 2), with a view of abandoning the now more or less out of date works at Glebe Island. It was stated that the new State abattoirs would be opened for use within a few months with an estimated daily slaughtering capacity for the immediate future as follows: Cattle, 2,000; calves, 800; sheep, 15,000; swine, 1,000.

In connection with the Homebush abattoirs, there will also be operated by the State of New South Wales a public live-stock and sales yards, which when completed will cover an area of about 80 acres. The total outlay of the State for the Homebush abattoirs and stockyards, it is officially stated, will be approximately £500,000 (about $2,500,000).

At Adelaide, South Australia, the writer visited the large abattoirs and public stockyards owned and operated by the municipality of Adelaide. These works are new, having been formally opened for public use on July 16, 1913. The buildings are constructed along good sanitary lines, concrete and brick being largely used in all structures. The daily slaughtering at present is approximately as follows, but the maximum capacity is considerably in excess of these figures: Cattle, 200; calves, 75; sheep, 2,000; swine, 100.

It is officially reported that the total cost to the city of Adelaide for the acquisition of the site of several hundred acres of land and the construction of stockyards, abattoir buildings, railroad tracks on premises, employees' cottages, etc., was £353,000, or about $1,760,000.

A large meat-export works is maintained and operated by the State of South Australia at Adelaide in which sheep and cattle are slaughtered on account for farmers and stock owners.

The extensive municipal abattoirs at Melbourne were also visited. The weekly slaughter at these abattoirs is about

2,000 cattle and 30,000 sheep during the sheep-killing season. Many of the smaller cities of Australia also own and operate public abattoirs.

ANIMAL DISEASES.

AUSTRALIA.

Considerable losses of cattle have been caused by tick fever, which is similar to if not identical with our tick fever of the southern United States. The carrier of tick fever in Australia is a tick (*Boophilus australis*) which is said to differ slightly from the Texas tick (*Margaropus annulatus*). These ticks now infest only the northern part of Australia, the southern States maintaining a rigid border patrol to prevent the spread of the infestation to those parts of the continent.

Considerable losses of cattle are also sustained in the northern and northeastern parts of the continent from the prevalence of contagious pleuropneumonia. Worm nodules (onchocerciasis) is also quite common in the cattle of northern and northeastern Australia. In this infestation a slender round parasite several inches in length is found in the intermuscular tissues of the living animal, particularly in the region of the brisket and stifle, where nut-sized nodules are formed by the coiling and partial encapsulation of the parasite. The life history of this parasite and its mode of gaining access to the muscular structures of the living animal have not yet been determined. It is not known that any appreciable losses of live animals occur from this infestation, although the presence of the parasite in dressed carcasses causes the rejection for export of considerable quantities of meat, particularly in northern Queensland. Anthrax and blackleg are said to exist in some districts. Tuberculosis is also present in cattle and swine. Blowflies attacking live sheep are particularly troublesome in some districts. Australia is said to be free from sheep and cattle scabies, glanders, foot-and-mouth disease, rinderpest, dourine, etc.

NEW ZEALAND.

Excepting animal tuberculosis New Zealand is remarkably free from many of the communicable diseases that hamper or threaten the production of live stock in most countries.

Of animal diseases said not to exist at the present time in New Zealand are the following: Tick fever, anthrax, cattle scabies, sheep scabies, glanders, hog cholera, contagious pleuropneumonia, worm nodules, rabies, dourine, rinderpest, and foot-and-mouth disease. The live-stock and meat division, department of agriculture, exercises sanitary control of live stock by a system of farm-to-farm inspection, whereby technical and practical advice is given the farmer and Government control assumed if certain infectious or contagious diseases are found to exist.

CORRIEDALE SHEEP—NEW ZEALAND'S NEW BREED.

During the itinerary in New Zealand visits were made to two large sheep-breeding farms in Canterbury. Through the efforts of a few sheep breeders of South Island in careful selection and breeding, a type of crossbred sheep has been produced which in late years has become so fixed in type and character that it is now recognized in Australasia as an established new breed and is officially known as the Corriedale. The foundation stock used in producing the Corriedale has been largely the Merino, Leicester, and Lincoln breeds. The Corriedales combine good fleece production of high-grade wool approaching that of the Merino in spinning merit with desirable mutton qualities of the carcass not possessed by the latter. It appears that the name was applied to the new breed largely on account of experiments in crossbreeding begun by Mr. James Little about 50 years ago on the Corriedale estate in Otago, South Island, but who later removed to Canterbury, South Island, where his experiments were continued. Specimens of Corriedale sheep are seen in Plate XLV.

VETERINARY EDUCATION, GOVERNMENT LABORATORIES, ETC.

Veterinary education is receiving proper recognition in Australia by the well-established colleges of veterinary science in the universities of Melbourne and Sydney. Meat inspection occupies an important place in the curricula of both schools. On September 11, through the courtesy of Prof. H. A. Woodruff, veterinary director, the writer visited the veterinary school of the Melbourne University. This

school is well arranged for classroom, laboratory, and clinical instruction. Two courses of study are provided, one of 4 and one of 4½ years.

On October 22 the veterinary department of the University of Sydney was visited. This school is under the veterinary direction of Prof. J. D. Stewart and is providing a thorough four-year course in veterinary science to its students.

During the investigations in Queensland advantage was taken of an opportunity to visit the State bacteriological laboratory and animal-experiment farm located at Brisbane. From this laboratory blood is supplied for inoculating work in tick fever; pleuropneumonia virus and blackleg vaccine are also supplied, and other investigations relating to animal diseases carried out.

While in New Zealand a visit was paid to the pathological laboratory and experiment farm of the division of live stock and meat, department of agriculture, which is located at Wallaceville, near Wellington, New Zealand. Aside from the routine work in the laboratory of examining specimens forwarded by inspectors, stockmen, and others for diagnosis considerable investigative work in serum therapy, animal tuberculosis, contagious mammitis, feeding, etc., is carried out on the experiment farm which contains about 160 acres.

THE FARM WOODLOT PROBLEM.

By Herbert A. Smith,

Editor, Forest Service.

THE farm woodlot problem may be put in four words. It is the problem of making the woodlot pay. Farmers can no more afford to keep unprofitable land than they can afford to keep unprofitable cows. Idle land which is not growing more valuable is like a boarder in the dairy herd; it eats up part of the profit made elsewhere. Good farm management may or may not call for the opening of an actual book account with the woodlot, but every good farmer needs to know at the close of the year whether he is richer or poorer for his timbered land.

It costs money to hold land. Every acre means carrying cost. The tenant farmer pays this cost in rent. The man who works his own farm should be able to earn at least rent and wages. If he sold the farm and put the money in a good savings bank it would yield him a yearly income without the lifting of a finger. His farm is an investment. It should be a paying investment. A bank which paid no interest would be a poor place to put savings. So a farm which does not yield its owner and user a fair return on his investment as well as a fair return on the labor and industry of himself and his family is a poor place to work. Its possessor is paying for the privilege of owning it, instead of making it pay him for what has been put into it. If the woodlot does not directly or indirectly compensate for taxes and interest allowance on its value, it is not doing its share toward making the farm pay. It is being carried at a net loss.

THE QUESTION OF TAXES.

Often woodland is taxed excessively. The higher it is taxed the harder is the task of making it pay. In most States timberland is assessed on the basis of its value, tim-

ber and land together. Land assessed on this basis is overtaxed as compared with land assessed on the basis of what it produces each year. The value of plowland for farm purposes is established by what it will earn. If the owner can make $10 an acre a year by growing wheat or corn or cotton or alfalfa on it, his land will have a value of perhaps $150 an acre. If it took two years to grow a crop, the land would be worth only half as much. Its owner would in that case object vigorously if he could not get his assessment lowered. He would object still more vigorously if he had to pay a tax also on the value of the standing crop, after having to pay too much on the land.

With woodland the case is still worse. Each year the owner may have to pay a tax on the merchantable crops of many past years. It is as though the owner of plowland had to pay a tax on the value of his field crops twice a week throughout the growing season. When a full-grown tree is cut down it may have been taxed 40 or 50 times over. Each year the land on which it grew has been valued not on the basis of its earning power, but on the basis of what it would bring if sold, timber and all. A tax levied on the income-earning value of the land would be much more equitable.

Certain States have provided for the application of essentially this principle. This is done by legislation under which a classification can be made, under suitable restrictions, of land to be used for growing timber, with taxation of the timber separately from the land. The tax on the timber is not paid until the crop is harvested. It is therefore a tax on the yield. In New York the yield tax is 5 per cent of the value of the crop harvested. Michigan lays a yield tax of 5 per cent on forest plantations, Massachusetts of 6 per cent, and Vermont, Connecticut, and Pennsylvania of 10 per cent, with different provisions for forests already established. In Pennsylvania the land must be classified by the State forestry reservation as auxiliary forest reserves, and thereafter the land itself can not be assessed at a higher value than $1 an acre; but the State compensates the school and road districts for loss of revenue by paying into the local funds for each of these purposes State moneys at the rate of 2 cents per acre of land brought under the operation of the law. A flat

or uniform valuation of the specially classified forest land at the same sum of $1 an acre is the method adopted in Michigan. Vermont, Massachusetts, and Connecticut provide for a valuation of the land separately from the timber; and when this valuation has been made it must stand for a long term of years. There are many variations in details and a condensed statement regarding these various laws is necessarily inadequate and imperfect, but it is sufficient for the present purpose to note that they all embody the principle of a tax laid on the yield as distinguished from an annual assessment and tax based on the value of the land and the growing timber crop together. Such a method is decidedly preferable to that adopted by a number of States which exempt, under certain conditions, reforested or reforesting lands for a term of years, or allow rebates or bounties on such lands.

Farmers may well interest themselves in the question whether, under the existing system of taxation, woodland is not overassessed. The extent to which growing a forest crop can be made to pay will depend largely on relief from excessive taxation. It is bad public policy to discourage the putting of waste land to work. Many farms have waste or semiwaste land which ought to be growing a tree crop. It may be rocky, steep, or thin-soiled land, used perhaps for poor pasture; or it may be old cleared land or old fields, producing mainly bushes or a straggling cover of poor trees which half stock the land with an inferior growth. Wet land may have its best use for growing timber, unless it can be drained and so made more valuable for other purposes. The less the tax burden which timber grown on waste or semiwaste land will have to bear, the greater will be the inducement to use the land in this way. But, after all, the main consideration for the man who owns such land, or for the man with a well-stocked woodlot, must be at the present time not how much he will have to pay out in taxes, but how much he can take in if he tries to practice forestry. He has the land, and must pay taxes on it according to the established system, whether the system is fair or unfair. What can he get out of it? Is there anything in forestry for him?

It is a question which concerns others than the farmer himself. Farm forestry should be recognized as a matter of general concern. The use made of a not inconsiderable fraction of our total land area and a very large fraction of our total forest area has decidedly its public aspect. If this potential resource is neglected or abused the annual production of raw material which gives employment to labor and adds to our National wealth is needlessly and seriously curtailed. Neither can we afford to disregard the importance of farm forestry from the standpoint of future timber supplies and timber needs. Whether we are thinking of our National income account or of our prospective wood requirements, what the farmer does with his woodlot is a question of public interest.

WOODLOTS AS SOURCES OF WEALTH.

The total farm area which either has or should have timber growing on it certainly exceeds 200,000,000 acres. This is more than one-tenth of our total land area, and more than one-fifth of our total farm area. If only the part of the country east of the Mississippi be considered, the situation is even more striking. Nearly 150,000,000 acres, or two-fifths of the total farm area, is either woodland or other unimproved farm land. Of this, something like 90 per cent must be actual or potential timberland—that is, land which is either now timber covered or might profitably be employed for timber production. Surely no one can contend that the question of yield from this land is a matter of indifference to the public. It is an aggregate area greater than Minnesota, Wisconsin, Michigan, and Maine combined. We could not afford to abandon such an area to a foreign country. We can not afford not to concern ourselves about what is going to happen to it while it remains in the hands of our own citizens. We want it so used that it will contribute as much as it can to National prosperity and wealth.

The productive capacity of the 200,000,000 acres of farm lands throughout the country which either have or should have timber growing on them is enormous. In area this is much more than the entire holdings of the Government in the National Forests. It is nearly equal to the area of the

Atlantic States from Maine to and including Maryland, with Ohio, Indiana, and Illinois added. With an average stand of 3,000 board feet to the acre (a much smaller stand than could be counted on if moderately good forestry were everywhere practiced) this land would have on it 600 billion board feet of timber. The annual lumber cut of the entire country is in the neighborhood of 40 billion feet. With an annual growth of 200 board feet per acre of sawlog timber—a moderate allowance under the practice of forestry—this land would produce in perpetuity the equivalent of our entire lumber cut. It should at the same time be capable of producing not less than 120,000,000 cords of wood other than sawlogs. At $3 per thousand feet on the stump the annual crop of saw timber alone would be worth $120,000,000, to say nothing of the returns to labor which its utilization would involve.

These figures are so staggering as to seem incredible. In point of fact, they will never be realized. This is not because the average rate of growth and average stand have been put above what may reasonably be expected, but because the present area of farm woodlands is much greater than it will eventually be. In the North and Middle Atlantic States clearing has unquestionably removed the timber from a great deal of land which should be reforested; but two-thirds of the farm woodland area east of the Mississippi is reported by the census as in the South, where the woodland comprises 31 per cent of the entire farm area. Much of this land will in the end be put to other use than timber growing.

Nevertheless, the quantity of standing timber now owned by the farmers of the United States reaches a huge total. It is estimated to exceed 250 billion feet of saw timber and 1¼ billion cords of cordwood. The question with regard to this timber, already produced and available for harvest, is quite independent of the question whether after it is harvested the best use of the land will be to grow another timber crop or to employ it for some different purpose. The farmers who own this timber want to make the most of it. The public should want that this timber supply be not wasted, but that it be drawn upon, as largely as possible, to supplement the supplies held by lumbermen and to support American industries and wage earners.

SOME MARKETING DIFFICULTIES.

Marketing the products of the farm to advantage has come to be recognized as a serious problem in the United States. It is difficult for farmers to get the full value of what they have to sell. Unless they are organized and have the services of a capable manager or expert in marketing methods they are likely to find the cash returns on what they have produced disappointingly small. Many farmers now feel, not without reason, that it is less important for them to learn how to make their farms yield greater crops than it is to learn how to be sure of getting what their crops are worth. There is often an extraordinary difference between the price which the producer receives and the price which the consumer pays. While city people are complaining that their food supplies cost them so much, country people are wondering indignantly why the commission merchants often send them back so little. It seems a matter of luck rather than good management if the cost of production of some crops is repaid. To the farmer the city appears, instead of welcoming him to suppy its needs, to be all the time saying to him, "Keep out of here. We don't want your wares."

The marketing of timber presents some of the same difficulties, but in aggravated form. Comparatively seldom can the owner of a small piece of woodland harvest his own saw logs. Lumbering is a business which calls for expensive machinery, efficient operation, skilled methods, and ability to dispose of the product advantageously. Most farmers must at the present time sell their saw timber on the stump to a portable-mill man. Such sales are ordinarily made for a lump sum. The mill man, experienced in estimating, goes through the woods and "sizes up" before he makes an offer, the quantity and value of the timber which he will obtain. The owner seldom knows anything about estimating timber, and has only the vaguest idea of what it ought to bring. Competition among mill men is seldom active enough to afford the owner much protection against a losing bargain. He has probably never had the thought enter his mind that there has been the equivalent of cost of production in past expenditures for taxes and in interest charges, which he should get back if he is not to

be out of pocket. Even though such a thought has occurred to him, he has no way of finding out what the cost of production has been. Naturally he is on very unequal terms with the would-be purchaser.

The small owner of timber is to-day very much in the position that the small apple grower would occupy if he had no other means of marketing his fruit than to sell it on the tree, with no knowledge of about how many barrels will be gathered or what apples are selling for. One advantage over the apple grower the timber owner has: His crop will keep. While ripe timber can not be held indefinitely before it rots, the loss in any one year is normally small. Quick utilization becomes imperative only when some destructive agency kills or threatens to kill the timber. If fire or chestnut blight or hickory bark borer forces the owner's hand, he may have to take what he can get or see his timber go to waste. But as a rule the man who has trees to sell need not be in a hurry about it. Unlike the apple grower, he can take time to find out what he ought to get, if he does not know.

Astonishing examples of what the farmer may throw away if he "sells a pig in a poke" are often encountered by foresters. A farmer in Massachusetts some years ago sold to a portable-sawmill man white pine which cut a million board feet. He received $1,200 for it, and thought he had obtained a good price. The same mill man paid the owner of adjacent white pine of the same quality a price equivalent to $7 a thousand. The first of the two owners practically presented the mill man with $5,800, which had been accumulating for perhaps more than a lifetime. It was as though his father had left him money in the savings bank and he had finally sold the account without ever having had the interest written up to find out what was to his credit. The second owner was wise enough to learn, before he attempted to sell his timber, how much he had and about what it ought to bring.

HOW THE FARMER MAY PROTECT HIMSELF.

Such mistakes should be avoided. It is quite possible for a farmer to learn how to estimate his own timber fairly well. Advice can be obtained from competent foresters regarding

reasonable terms of sale. Farmers will find it well worth while to seek advice before deciding on a sale of timber from the woodlot. It may be, and in fact will usually be, that the best protection of the farmer's interests calls for special provisions in the sales contract. An example of the advantage of securing advice from a competent forester occurred in Connecticut when a woodlot owner was on the point of accepting an offer of $300 from a portable-mill man. Had the offer been accepted the mill man would have cut practically all the owner's timber. He would have taken many fine young trees which, because only half grown, were much more valuable to keep than to cut. He would also have left the woodlot in poor shape for the production of a new crop, and exposed to a bad fire risk because of the slash. The owner sought the advice of the State forester. In Connecticut this advice could be had by paying the expenses of the foresters sent to make a personal examination. As a result the owner finally sold only 40 per cent of his timber, for which he received $1,000. The rest was reserved for a subsequent harvest, with the certainty that it would grow more rapidly and be worth more money because the cutting was planned with the welfare of the forest in mind.

Forest culture is as much of an art as is corn culture. A good woodlot, like a good cornfield, is the result of applying intelligent methods to produce a full, valuable crop. A cornfield with fail spots, empty hills, feeble stalks, and half-filled ears is neither a credit to the farm nor a paying investment for the farmer. No more is a woodlot half stocked with inferior trees. When timber is cut is the time of all times to apply forestry. The way in which the cutting is done will determine what the subsequent condition of the woodlot will be.

The States of California, Connecticut, Kansas, Kentucky, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, North Carolina, Ohio, and Pennsylvania employ professional foresters from whom advice can be obtained by writing to the State forester at the State capital. In States which have no State forester, the Forest Service of the United States Department of Agriculture furnishes advice to woodlot owners by letter. It supplies a suggested form of contract for the use of wood-

lot owners contemplating a timber sale, and it has issued a "Woodsman's Handbook" (purchasable from the Superintendent of Documents for 25 cents), which contains practical instructions for estimating timber. It also maintains lists of the users of special classes of material, so as to be able to give advice regarding the possible markets which the farmer might find open for his timber if he wishes to handle it himself.

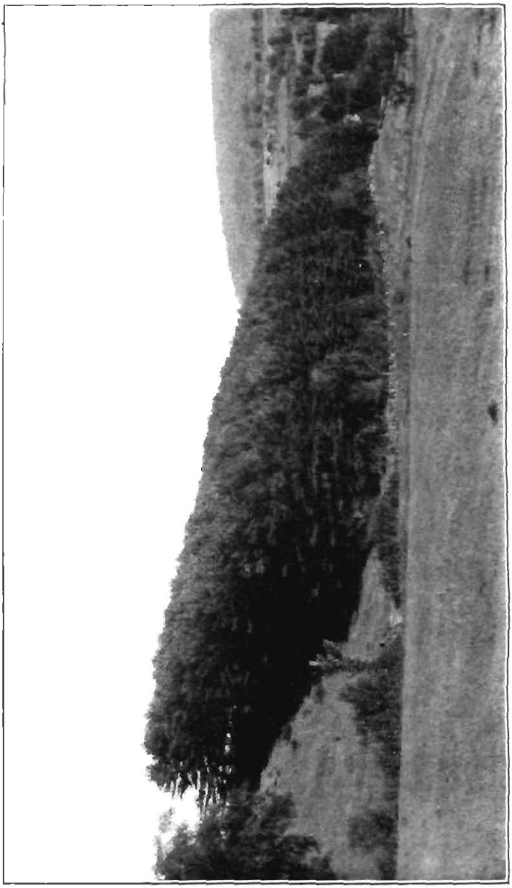
This suggests some new questions. Has the farmer any alternative to selling to the portable-mill man on the stump? What chance has he to market his own material? Could farmers cooperate in handling their woodlot crop as they are now in many places cooperating to handle their apple or peach or citrus-fruit crop?

That the small owner of timber is to-day in much the same case with an apple grower who could only sell his fruit on the tree has already been remarked. In point of fact his case is in some ways far worse. Like apples, lumber should be graded to bring the best price. The portable sawmill operator seldom operates on a large enough scale or with good enough equipment to be able to get its full value out of the material which he mills. He is likely to produce boards or dimension material of uneven thickness, sawed without the best judgment. In mixed growths, and especially in handling hardwoods, various kinds of lumber will be produced without the possibility of sorting, still less of grading. The purchaser who receives a shipment of such lumber finds himself at an enormous disadvantage in handling it as against the carefully standardized product of the great mills which supply the general lumber market. Even a few barrels of apples may be graded so that they do not all have to be sorted over before they can be satisfactorily retailed; but the log butcher sawing perhaps 5,000 feet a day can not possibly ship material classified by carload lots to meet reasonable market demands.

The farmer loses, therefore, not only because he does not know how to sell to good advantage, but also because of the inefficiency which in varying degree characterizes the small lumber mill and operation. In some cases it has been found possible, by bringing several neighboring owners together in

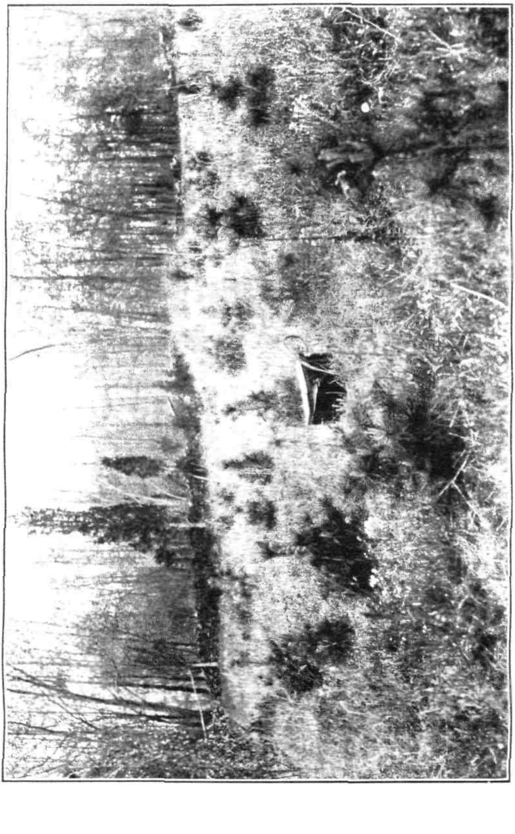
a common sale, to create a logging opportunity suitable for the best class of portable-mill operation. Such logging means of course better utilization and should result in better prices to the owners of stumpage. There is great need for owners of farm woodlands to try to cooperate with each other. By collective bargaining they should be able to secure decidedly better terms than when each sells independently of the rest. The truth is that farmers are at a disadvantage as timberland owners because their holdings are individually too small. Subdivision of ownership has been carried beyond the best working unit. There is need for a reverse movement. An association of farmers with enough timberland held in common ownership to make a good working forest would be in position to market a high-grade output, where a market for such an output is open, far more advantageously than they can do as individuals. Such an association could employ a trained forester as adviser if not as manager. As the cooperative movement among farmers becomes stronger it can be expected to develop forestry as one of its fields. But cooperation in the handling of timber or timberlands will probably follow, not precede, cooperation in other lines. It will require the habit of working together to be somewhat well developed because it will involve a wider departure from current methods than is involved in many other forms of cooperation.

Even without the practice of cooperation there is room for more extensive marketing of the woodlot crop by the individual farmer than now commonly takes place. When the farmer sells anything but stumpage it is now principally cordwood, railroad ties, and telegraph and telephone poles. To be able to sell timber in a form which pays the farmer day wages as well as stumpage value is a great advantage. In 1909, when the last census was taken, the farmers of the country sold standing timber to a total value of $21,723,000, while they produced material for sale in a form involving a labor charge to a total value of $70,801,000. On the stump, the material which brought them the $70,000,000 was probably worth less than was the standing timber for which they received the $20,000,000. The greater part of the excess of $50,000,000 which they realized on material not sold on the stump may reasonably be assumed to have gone into their



WHERE PLANTING PAID.

[This 3-acre piece of sidehill, where in 1873 white pine was planted on a worn-out field, sold in 1911 for $120 and about 1912 for $1,000.]



WHITE PINE PLANTATION ON OLD FIELD IN CONNECTICUT, THREE YEARS AFTER PLANTING.

FIG. 1.—PLANTING CREW AT WORK IN TIMBER WHICH HAS SUFFERED FROM REPEATED FIRES.

[Reproduction has been destroyed, soil conditions injured, and many trees affected with decay. Damaged trees have been cut and utilized.]

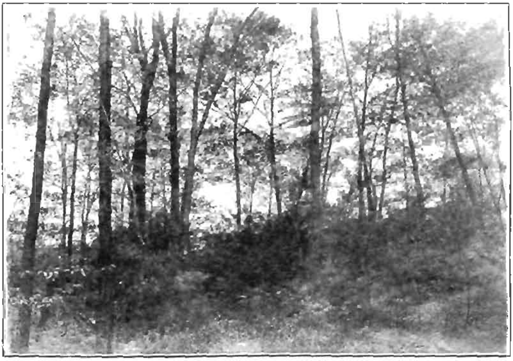


FIG. 2.—A PORTION OF THE SAME TRACT REJUVENATED THROUGH UNDERPLANTING WITH WHITE PINE, WHICH IS NOW ESTABLISHED AND MAKING GOOD GROWTH.

REJUVENATING DAMAGED WOODLANDS.

FIG. 1.—OAK AND HICKORY STAND IN WHICH LARGER TREES WERE CUT YEARS AGO.

[Middle-aged trees but no young ones. Grass has replaced the natural forest floor; no wind-mantle on forest border to prevent drying out of soil.]

FIG. 2.—PRACTICING FORESTRY. VALUABLE YOUNG STAND OF WHITE OAK.

FIG. 1.—THE FINISH OF THE FOREST.

[When these old trees are cut or die the land will be clear

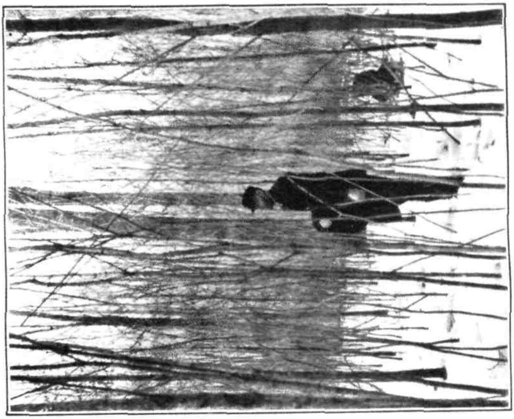


FIG. 2.—YOUNG GROWTH UNDER OLD TREES IN FORMERLY PASTURED WOODLOT. STOCK KEPT OUT FOR 11 YEARS.

FIG. 1.—QUARTERING STAVE BOLTS ON HOMESTEAD.

FIG. 2.—STAVES SEASONING NEAR PORTABLE MILL SET UP IN THE WOODS.

WORKING UP WHITE OAK STAVE MATERIAL IN ARKANSAS.

A WOODLOT IN FINE CONDITION.

[The yellow poplar in the foreground is 12 inches in diameter breasthigh, and 75 feet tall. Harvesting the heavy timber will stimulate growth of the smaller trees and open room for more reproduction.]

FIG. 1.—WEST VIRGINIA MILL WITH A CAPACITY OF ABOUT 3,000 BOARD FEET PER DAY, OWNED BY THREE FARMERS WHO DO THEIR OWN CUTTING, LOGGING, SAWING, AND SELLING.

[Effects of destructive logging appear in background; poor prospects for future growth.]

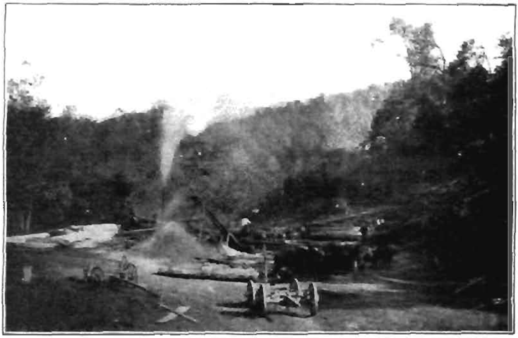


FIG. 2.—LUMBERING WITH PORTABLE MILL ON NORTH CAROLINA TRACT WHERE FORESTRY IS PRACTICED.

pockets as recompense for the use of their time and teams. Woods work generally comes when farm work is slack, so that day wages earned then may mean a substantial addition to the farmer's yearly income. There is every reason why the farmer should give careful attention to the opening for more extensive sales of material in a form calling for his labor.

Examples of such forms are: handle material, veneer logs, vehicle stock, excelsior bolts, pulpwood logs, extract material, and cooperage bolts. The special industries which make use of these forms of wood have, of course, their individual requirements; and unfortunately to a considerable degree the single establishments which make up some of these industries have also individual requirements. Better standardization of grades and specifications would benefit both woodlot owners and the industries. The woodlot owners would get a better outlet for their high-grade product, while the industries would get a broader field of supply. As the reservoirs of virgin timber are drained lower and lower, the necessity of drawing upon the scattered but permanent holdings of the small owner will grow more obvious. Ultimately many of the woodworking industries will have to depend on such sources of supply to escape extinction. Even now there is a steadily broadening opportunity for farmers to sell to manufacturing concerns.

Not only the Forest Service, but also all State foresters, are able to furnish inquirers with addresses of wood-using firms and with information regarding their requirements. Many farmers are now writing to the Forest Service to learn what industries in their neighborhood purchase logs, bolts, or billets suited to a special kind of use. Handle manufacturers want high-grade hickory and ash in split billets or round bolts. Red gum, cottonwood, yellow poplar, maple, and white-oak logs of good quality are salable in some regions to veneer manufacturers, usually at prices well worth the farmers' attention. The manufacturers of vehicle stock are usually in the market for high-grade hickory and oak split billets and dimension stock. Excelsior plants purchase aspen, pine, basswood, and cottonwood bolts. Some pulp mills are located in woodlot regions and provide markets for such species as pine, aspen, gum, and cottonwood. The

manufacturers of tannin extract use chestnut wood and oak and hemlock bark. Tight cooperage establishments call for quartered white-oak bolts, while slack cooperage plants use either quartered or round logs of red gum, beech, elm, chestnut, and other woods. Dogwood and persimmon are wanted by makers of shuttles, and locust by makers of insulator pins. These are examples of the special products which the woodlot owner can often market in his own region. More and more it is going to pay farmers to have such products to market—in other words, not only to harvest the woodland crop and sell it themselves, but to grow the kinds of wood *that are the most salable in each region.*

In order to find a market for the above special products, the farmer should first write to his State forester or to the Forest Service for a list of wood-using plants in his region and should then obtain from each of these plants a copy of *the specifications under which they purchase material, price* quotations, and instructions for shipment.

It must be said, however, that the difficulties in the way of marketing material in such special forms are greater than they should be. Like the city, the wood-using industries may seem to the farmer to be saying, "Keep out! We don't want your wares." Arbitrary grading at the factory sometimes compels the shipper to accept an unduly low price for good logs. Trade tends to keep the beaten track, so that an outsider can not always readily break in. There is need for a much more thorough study of the marketing situation which the farmer with forest products to dispose of faces than has yet been attempted. Since it concerns the value to farmers of the 250 billion feet of saw timber which their farm woodlands contain, and increased returns from a money crop which is even now yielding farmers in the neighborhood of $100,000,000 a year, there is good ground for making the study. Especially desirable is an experimental test of cooperative lumbering and marketing by an association of farmers, with the opportunity which it might afford for larger output and more permanent relationships with purchasers. Such an association would have many of the advantages which farmers have secured through cooperation in handling other *classes of farm products.*

WOODLOT VALUES, PRESENT AND FUTURE.

All this, however, relates to making the woodlot pay better as the source of a money crop. It is true that in the long run the opportunity to obtain a money crop from the woodlot will be for most farmers the chief incentive for practicing forestry. Because very much timber which now has no sale value is going to bring a good price a few years hence, men who are farseeing will not too easily part with what they may have, but, on the contrary, will do what they can to have good timber growing up. A woodlot may be made an auxiliary to the savings bank, rolling up a larger deposit each year. But quite apart from its value as the source of a money crop, the woodlot has an important relation to success in farming as a source of material for home use. The woodlot often pays well, though not a dollar's worth of the wood crop is sold.

There is a difference between farm woodland and the farm woodlot. Farm woodland is farm land which has not yet been cleared. Farm woodlot is a term which might best be used to mean a part of a farm permanently devoted to timber production, under a sound plan of farm management. The size and the location of the woodlot will depend upon various considerations, of which the most important are the home needs of the farm, the character of the land, and the present and prospective market for material from the woodlot.

A woodlot, when the word is used in the restricted sense just indicated, implies that a relatively stable apportionment of the land as between use for field crops or pasture and use for the forest crop has been made. In point of fact, taking the country as a whole, this point has not yet been reached. Neither the area nor the location of the woodlot can generally be considered as settled. Doubtless many farms which should have permanent woodlots now have under timber a part of the farm which should and eventually will be cleared; and other farms or the same farms have a certain amount of cleared land which should be forested. This is only what would naturally be expected when it is considered how the woodlot has come to be what it is and where it is.

The present farm woodland is the outcome of a process of shrinkage. It is in no sense the product of calculation, the outcome of careful planning based on a study of the woodlot needs of the farm or farmer and the relative value of all portions of the farm for different forms of use. In the timbered regions the settler began to clear where he could most quickly and most easily gain a foothold. The all-important matter was to be able to sustain himself and his family at the earliest possible time. The uncleared part of the farm became a source of supply of the wood needed on the farm. Generally it furnished pasture also. It was the left-over wild land. As more land was wanted for field crops the forest was pushed back. The remnant was still more than ample to supply home needs. Where a local mill furnished a market for logs the virgin stand furnished a source of money income and of profitable employment in the winter, when farm work was slack. Later on it became possible to sell cordwood, and to some extent other products. But at least until the supply of wood began to become relatively scarce locally the chief value of the woodland was much more likely to be for the supply of fuel, fencing, farm timbers, and the like used on the farm itself than as a storehouse to draw upon for salable material.

The present is a transition period. To a large extent the individual farmer is in a position with regard to his farm timber supplies comparable with that in which the country as a whole finds itself. He has drawn steadily on his reserve supply without much thought about its renewal, until it is becoming seriously depleted. In some regions the woodlot has been used as a pasture so generally that it is rare to find one with young trees in it. The cattle have eaten off and trampled down the seedlings, compacted the soil, and destroyed the leafy fringe which normally screens the interior of the woodlot against too free a circulation of the air, until one can see straight through the timber. In such a woodlot dying tops often betoken a stand which has succumbed prematurely to disease, the result of the untoward conditions. In a short time the farmers in such regions will find that they can no longer draw upon their reserve supply of timber as they have in the past. What will be the result?

As the industrial development of the country has gone on a great change has taken place in the use made of the farm woodlot. Railroads have brought both coal and lumber from the general market near enough to the farmer to make it in many regions cheaper to buy fuel than to cut and haul it, and cheaper to build with lumber sawed in mills 500 or 1,000 or 2,000 miles away than to get logs from the home place to the nearest local mill, pay the sawing charge, and draw the lumber back. Wire fencing has almost put an end to the splitting of rails. Concrete is coming into widespread use for construction. Undoubtedly the farm is much less dependent on the woodlot for the supply of material consumed on the farm than it was in earlier days.

Nevertheless, the woodlot still remains an important matter. Merely from the standpoint of diversified crop production, the possible field for timber growing calls for careful study. The forest crop is preeminently adapted to utilize land of low value for other purposes, and land too steep or broken for plowing. Thin-soiled hilltops, rocky hillsides, and sandy areas are examples of the places where trees will probably produce more, if intelligently cared for, than will any other crop that the land will grow. A very strong point for the woodlot is the chance which it affords for winter work. Even though the farmer makes only day wages, to be able to earn something in an otherwise unproductive period may make the difference between a farm run at a profit and a farm run at a loss. There is every reason to anticipate a better market for high-grade timber grown on the farm a few years hence than that which now exists. The danger is that because this is a transition period farmers may fail to see what lies a little way ahead, and do themselves serious injury. Timber is still cheap. It is being cut in the regions where abundant virgin supplies still exist, and the lumber manufactured from it is sent into every nook and corner of the land where the railroads have penetrated. This form of lumber production is at high tide. The current everywhere runs strongly inland. As the tide turns, a movement in the opposite direction will probably begin to develop. Then it will be much more worth while than it is now to have good timber in the woodlot.

It is better worth while even now than many farmers realize. A farm for sale will generally bring a decidedly lower price if it is without timber. Even though there is little direct money return obtainable from the woodlot, it is a good asset. Inquiries made within a year by the Forest Service have shown that in some regions where the market for woodlot products is not good a woodlot can nevertheless be counted as adding very materially to the value of the entire farm. Undoubtedly this added value is partly sentimental. The land brings a higher price not altogether because more money can be made on it, now or later, in consequence of its having timber. A higher price is gladly paid because the farm is a pleasanter one to live on. The case is something like that of a house in town that stands in well-kept grounds and is in good repair. A shabby-looking place should be "spruced up" before it is put on the market, if the owner wants to get its full value. So the thrifty farmer may be discoverable by examining his woodlot, as well as his fences or dooryard. His thrift will pay well if the time ever comes when he wants to dispose of his farm.

There is also the value of the woods as shelter. To the extent that this adds to the comfort of those who make the farm their home, the protection afforded by the woodlot is a part of what has been referred to as its sentimental value. It helps make life more agreeable. A very real money value, however, attaches to timber which protects live stock against high winds and storms. In regions where a naturally flat country interposes little resistance to the sweep of cold winds, the degree to which timber furnishes windbreaks and shelterbelts has a material relation to the severity of the conditions which must be faced. Further, forest growth often affords valuable protection for field crops against parching winds.

Another matter to be reckoned with is the gain that will come to the owners of timber through improved means of transportation. As good roads become more common the value of timber will rise. An improved highway between the woodlot and the railroad, that will increase from 50 to 100 per cent or more the weight which a team of horses can

haul over it, may double the value of the farmer's stumpage, or make salable timber which previously had no market value at all. All these matters call for consideration. The place of the woodlot in the farm economy requires to be carefully worked out. Fundamentally the problem is one of developing a wise, farsighted policy of farm management. Only through the development of sound principles of farm management can the farmer find a true solution of the woodlot problem. That problem was stated at the outset as the problem of making the woodlot pay. It is an integral part of the larger problem of making the farm pay. It involves a determination of the relation of the woodlot to the rest of the farm, physically and economically; of the amount of land which the best interests of the farm in the long run call for holding in timber, and where the woodlot should be located, and of practicable solutions of marketing difficulties. With such a determination made, a great step forward will have been taken both toward promoting the prosperity of the farmers of the United States, whose timber occupies one-fifth of our entire farm area, and toward bringing about the best use of a great part of our basic resource, the land, for the supply of the needs of all the people.

No attempt has been made in this article to tell how the woodlot should be taken care of in order to make it fully productive. This is not because the methods used by the farmer in the actual handling of his woodlot are unimportant. Unless good forestry is practiced the timber crop will become less and less, both in quantity and in value. To allow the woodlot to take care of itself as though it were wild land, valuable only as a storehouse on which the owner may draw at will for marketable or usable material, is a most shortsighted course. A good knowledge of how to farm should include knowledge of how to make the part of the farm that is in timber grow the highest quality and largest quantity possible of what will profit the farmer most. Knowledge of this sort is now increasingly brought within the farmer's reach. It is taught in most of the agricultural colleges and is embodied in many publications. In the States which have trained State foresters, farmers can obtain information regarding the methods suitable to their neighborhoods and specific needs by writing to these officers.

Where such information is not obtainable, the advice of the United States Department of Agriculture is available.

Because of the wide range of natural conditions presented by the woodlots of different regions, localized information is needed to enable the woodlot owner to make the best use of his land. As with field crops, the successful growing of forest crops requires a good knowledge of the requirements of whatever it is desired to produce. This knowledge can not be obtained merely from books. To be his own forester the farmer must study his woodlot. He must observe and think. He must remember that the chief tool of timber culture is in the United States the saw or ax. Even when clear cutting is practiced, the establishment of a new crop will usually be obtained from natural reseeding; forest planting is as a rule advisable only when it is desired either to grow timber on new areas or to regenerate badly depleted woodlands on which a full stand can not be secured within a reasonable time by unaided nature. It follows that in cutting timber there must always be a definite appreciation of what the effect will be, and a definite purpose as to what it is intended to bring about. In short, the practice of forestry is an art. It requires observation and experience to be successful, quite as much as does the successful growing of agricultural crops. Full utilization of the productive value of farm woodlands can be achieved only after knowledge of the right cultural methods has become generally diffused as a part of the knowledge of farming possessed by the agricultural population of the country.

NEMATODES AND THEIR RELATIONSHIPS.[1]

By N. A. COBB,

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INTRODUCTION.

THE soils of our yards, gardens, and fields swarm with thousands of kinds of minute animals and plants of which we know little or nothing. We depend on the soil for our very existence, and it may seem that this fact should have caused us long ago to make ourselves thoroughly acquainted with it and all its inhabitants; yet the truth is otherwise. Here beneath our very feet are microbes, protozoa, fungi, and many other kinds of small organisms, thousands of species, of which we know hardly the first thing beyond the mere fact of their existence. In some ways this ignorance extends even to the higher plants and animals. Confront the ordinary botanist with the complete root system of one of our common plants and ask him what it is and the chances are he will have to confess his ignorance. While his knowledge of the above-ground parts of the higher plants is most systematic and extensive, in most cases the corresponding parts below the surface of the ground are almost wholly unknown to him.

Relatively speaking, then, in a biological sense, this soil we daily tread under foot is almost a veritable terra incognita. Why is this so? It is difficult to formulate a reasonable answer. The fact is that our biological researches as a rule do not extend below the surface of the ground. This lamentable fact is, of course, an answer to the question, but it does not seem a reasonable one.

Inhabiting the soil in myriads, hidden behind this veil of ignorance, there is a group of organisms known as nematodes. Some members of this group have forced themselves on our attention by the enormous damage they do to crops. These, however, so far as numbers are concerned, constitute a very

[1] The illustrations are mostly from drawings made from nature under the author's direction by Mr. W. E. Chambers. Figures 1 and 19 are from the author's drawings, and figure 10 was prepared by Miss Ella Welborn from the basis of Schepotieff's plates.

insignificant minority. There are multitudes of others, some only in a lesser degree injurious, still others that are beneficial, and yet others, the great majority, of unknown

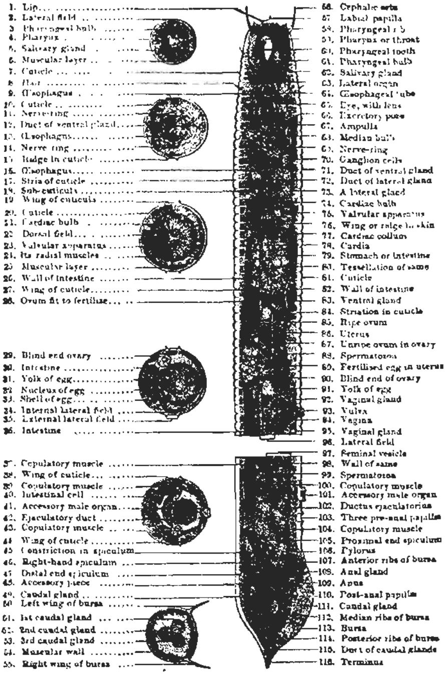


FIG. 26.—Diagrammatic representation of the nematode anatomy. The upper part of the figure and four corresponding circular cross sections at the left represent the anterior half of a female nematode seen from the right-hand side. The lower part of the figure and the two corresponding cross sections represent the same view of the posterior part of a male nematode. The cross sections are placed opposite the portions of the side view to which they relate.

economic significance. So little do we know of this vast multitude of soil-inhabiting nematodes that the first spadeful of earth we lift is practically certain to contain kinds

never seen before (fig. 27). Numerous as are the nematodes inhabiting the soil, the aquatic species are even more numerous. Furthermore, thousands of species of nematodes occur as parasites in animals and plants.

At present our knowledge of this group, such as it is, is confined to a comparatively small number of people. The reasons for this are not far to seek. If we consider any group of animals the study of which is popular—as, for instance, birds—we find the individuals of that group both large and numerous, and, moreover, much in evidence; and it will be found, in most cases, that they are serviceable to man; they furnish him food, raiment, or some other valuable material; or they are ornamental, or attractive as pets, or useful in some other way. Now, it is not unfortunate for the nematodes that they are none of these, but it is unfortunate for us, if on that account we are prevented from knowing much that would be most useful to us, as well as interesting and diverting.

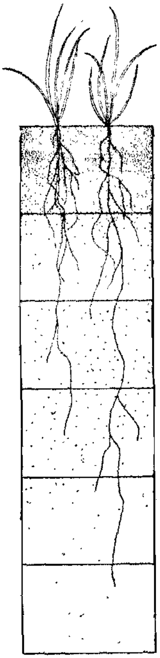


FIG. 27.—Diagram representing the upper foot of soil, and *showing the relative abundance of nematodes in each* successive 2 inches. Derived from a low-lying alluvial soil carrying about 3,000,000,000 nematodes to the acre. Most of the nematodes are in the upper 3 inches. Though shown distributed uniformly in each layer, they are really most numerous about the roots of plants.

Nematodes do not furnish hides, horns, tallow, or wool. They are not fit for food, nor do they produce anything fit to eat; neither do they sing or amuse us in any way; nor are they ornamental—in fact, when they are displayed in museums the public votes them hideous. Lacking in all these respects, they fail even in furnishing any moral or praiseworthy example; they are not known to be industrious like the ant, or provident like the bee, indomitable

like the spider, or frugal, or honest, or anything else that is admirable. What claim, then, one may ask, can such beings lay to our attention? I think I hear some outraged naturalist exclaiming in reply: "And must a thing be useful to deserve attention? Must a thing have an assessed money value to be worthy of study? Is there no idea above meat for dinner and raiment for the reception? Is everything to be measured by its value in dollars and cents? Thank God, there are some things so far removed from the lucre system we allow to dominate our lives that it is as impossible to measure the one in terms of the other as it would be to buy a ticket into Heaven." I should have a good deal of sympathy with the man whose wrath boiled over in this manner and found expression in such burning language, but, at the same time, I confess I should have more hope of converting others to my way of thinking by adopting another tone and different tactics. Descending to one of the lowest planes on which an appeal could be made, I should say that, if, for example, it could be proved that nematodes would draw as a show to such an extent as to cause the populace to part with half a dollar each for a place in the balcony, a dollar or two for the dress circle, and all the rest of it, we might feel their claims for attention to be meeting with some little encouragement. Such a demonstration would be more forcible than any tirade against even the most reprehensible prejudice.

But it is unnecessary to descend to any such appeals to show the advisability of more fully acquainting ourselves with these organisms, for although, so far as we know at present, nematodes may not often be directly beneficial to man, a knowledge of them would be useful to every person, simply because, though he may not know it, he is infested by them, either continually or from time to time. This unpalatable fact needs no proof to the initiated; but those not informed will doubtless be surprised to learn that no less than about 50 kinds of nematodes are known to infest the human body.

Our domesticated animals suffer in like manner, and even more severely (fig. 28). Thus, in countries where the wealth consists largely in live stock, as, for instance, in the western part of this country, in Australia, and in the Argen-

tine Republic, the monetary loss caused by nematodes is always considerable, and sometimes very great. The parasitic nematodes shown on this page exist in millions in most of the great sheep-growing countries; these are only a fraction of the species of nematodes that attack sheep, and are mentioned simply as embodying a typical case among our domesticated animals. To every person, therefore, and especially to medical men and veterinarians, these parasitic nematodes should possess no common interest.

FIG. 28.—Natural-size figures of some of the nematode parasites of the sheep: *a*, *b*, Found in the duodenum; *c*, in the intestine; *d*, in the stomach, very common and injurious; *e*, in the intestine, very common and injurious; *f*, in the anterior part of the small intestine, inflicting severe bites; *g*, in the large intestine. These are only a fraction of the nematodes known to infest the sheep.

Nor are the crops of the farmer free from the attacks of these creatures. Wheat, the sugar beet, coffee, and scores of other crops are frequently decimated or even ruined by diseases caused by the attacks of microscopic nematodes.

Beyond doubt a complete knowledge of nematodes, if properly applied, would enable us to save a vast amount of life and treasure and prevent a vast amount of suffering.

But it is by no means entirely for these reasons that I would like to see these organisms receive a greater amount

of attention. They possess a powerful interest because of the unusually clear view they give us of the various processes relating to life, and I believe this fact could easily be turned to educational account; in fact, I know it could. In the contemplation and discussion of one of these organisms, I have seen the statesman forget his social problems, the judge his law, the mathematician his quantities, the artist his art, the philanthropist his schemes, and exclaim and question in terms of enthusiasm and interest concerning which there could be no doubt.

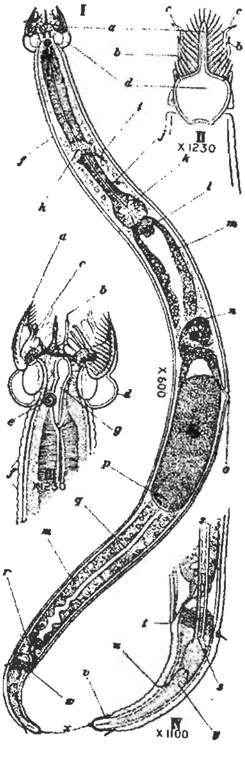


FIG. 29.—A very remarkable nematode, Wilsonema, found in soils in various parts of the United States. How it can make its way through the soil without damage to its wonderfully complicated and delicate mouth parts is a mystery. *I*, Lateral view of female; *II*, dorso-ventral view of the head of the same individual; *III*, enlarged lateral view of the head of same individual; *IV*, lateral view of the tail end. *a*, Ventral appendage, which, together with the corresponding dorsal appendage, acts as a sieve; *b*, lateral tactile organ associated with the sifting apparatus; *c*, internal elements (supports?) of the sieves; d, inflated valvular apparatus; *e*, amphid; *f*, cuticle; *g*, pharynx; *h*, nerve ring; *i*, excretory pore; *j*, esophagus; *k*, threefold valve of the cardiac bulb; *l*, cardia; *m*, wall of intestine; *n*, flexure of anterior ovary; o, vulva; *p*, egg; *q*, lumen of intestine; *r*, rectum; *s*, lateral wings; *t*, anus; *u*, caudal seta; *v*, spinneret; *w*, anal muscles; *x*, apical portion of spinneret; *y*, one of the three caudal glands.

Formerly it was my duty, as professor of biology, to bring before the students in my courses, first in a secondary school and later in the university, a series of animals and plants for dissection and study, and I can safely say that no organisms excited so much interest among those young men, or furnished them

with a greater amount of instruction, than small species of free-living nematodes. These little animals present a wonderful complexity of organization combined with such transparency that very little is hidden from view. Digestive system, nervous system, excretory system (fig. 29), muscular system, sexual system, all are to be seen with most instructive wealth of detail and in full action in the living animal. My experience in this matter makes me very confident in saying that professors of biology could do far worse than to introduce into their courses a more careful examination of these creatures.

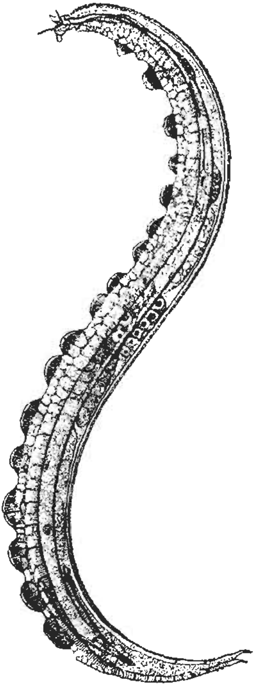


FIG. 30.—The asymmetrical nematode, Bunonema. This apparently deformed little creature presents relatively monstrous warts on one side of its body. It belongs to a large group, usually to be found in decaying matter.

NEMATODES AND THE NEW SCIENCE OF HEREDITY.

If it were necessary to fortify these assertions, I might call attention to the fact that since the days of Leeuwenhoek and the invention of the microscope these organisms have excited a keen interest in the minds of great naturalists. Anyone will be convinced of this by even a casual glance at the literature relating to any one of several common species—for instance, the nematode so common in table vinegar and popularly known as the "vinegar eel." I might also call attention to the fact that some of the most momentous of all our scientific discoveries have been made through the

instrumentality of nematodes; witness the discovery of the formation of the polar bodies in the ovum, the coalescence of the spermatic nucleus with that of the ripe ovum, and the subsequent cell-division phenomena, leading up to a science of heredity. The clarity of the nematode egg makes it particularly suitable for investigations of this kind.

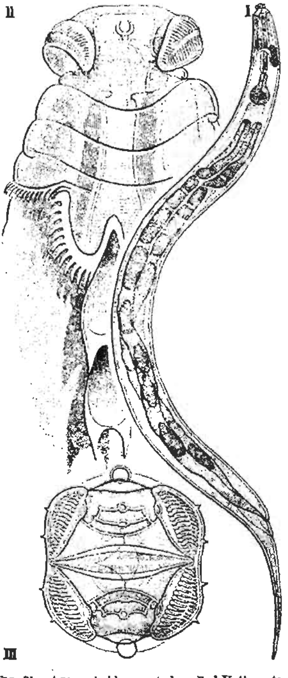


FIG. 31.—A remarkable nematode, called Heth, notable on account of the numerous sieves through which it sifts its food, and also on account of the acute backward-pointing barbs, of relatively large size, with which its head is armed.

If one removes from the small part of one of the ovaries of the common lung worm of the frog, *Rhabdias nigrovenosa,* an egg that has not yet begun to segment, and places it in water under a microscope magnifying 300 to 400 diameters, he may easily observe one of the most impressive and instructive of all the phenomena of life—the formation of a young animal inside the egg. This egg, which is at first a single cell, becomes in the course of a few hours under our very eyes a living, actively moving animal. This impressive spectacle begins by the formation from the original cell of two others of slightly unequal size, the change being accompanied by the karyokinetic phenomena concerning which there is nowadays so much discussion and research. Each of these cells

again divides, and so the rhythmic change goes on, giving rise to tissue after tissue and organ after organ, until the baby nematode lies before us complete and ready to begin its active battle for existence. The observer rises at last, feeling that he has indeed approached as near to the mystery of life as it is yet given to man to approach.

We are gradually rebuilding the science of heredity, and one of the basic facts of this renovation is the union of the nuclear material of two parent cells to form the nucleus from which the offspring grows. This flow or transportation of nuclear material from parent to offspring is a matter of supreme interest and is now being studied with the minutest care, and is found to follow laws capable of such exact definition that we are able to base upon them predictions as to the nature of the offspring. Practical results of vast importance in the breeding of animals and plants are, therefore, now only a matter of time.

The fundamental facts in this very important new science came to light through observations upon the eggs of nematodes. It was in a nematode egg that it was first observed that the animal male and female nuclei actually coalesce to produce the new compound nucleus, or pronucleus, which alone is capable under the usual normal conditions of growing and producing a new individual.

Again, it was in the nematode egg that it was first proved that the pronucleus when it divides sends into each of the two new cells a definite portion of the matter it derived from each parent. Both of these discoveries are absolutely fundamental and of enormous practical significance.

It is no wonder, therefore, that there should exist on the part of those most familiar with these fields of research, a wish that our knowledge of nematodes should be increased and brought to the attention of a larger number of people.

An old adage assures us there is no royal road to knowledge. There is certainly no royal road to a knowledge of nematodes. The traffic in this direction has not justified the installation of through trains and sleeping cars; so he who takes this route must be prepared to put up with inconveniences, and to make the best of certain disgusting passages. To the squeamish, the lazy, the impatient, the inaccurate, about to take tickets for this journey, I should say, "Don't do it! It

won't suit you." But to him not afraid of work, brave under discouragements, patient, cautious, and with a good

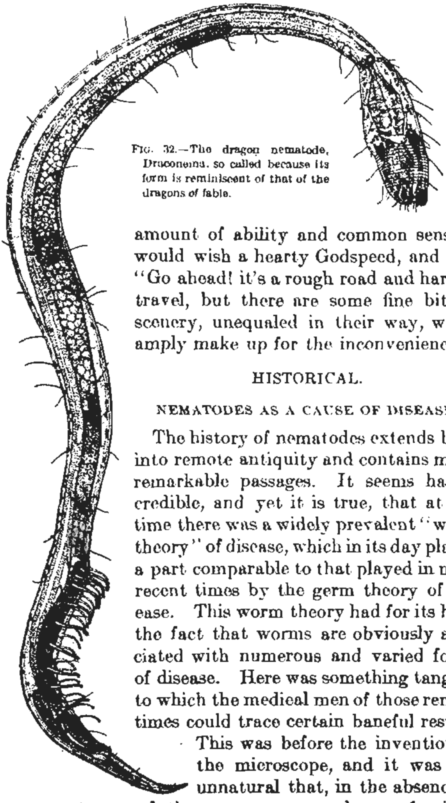


FIG. 32.—The dragon nematode, Draconema, so called because its form is reminiscent of that of the dragons of fable.

amount of ability and common sense, I would wish a hearty Godspeed, and say, "Go ahead! it's a rough road and hard to travel, but there are some fine bits of scenery, unequaled in their way, which amply make up for the inconveniences."

HISTORICAL.

NEMATODES AS A CAUSE OF DISEASE.

The history of nematodes extends back into remote antiquity and contains many remarkable passages. It seems hardly credible, and yet it is true, that at one time there was a widely prevalent "worm theory" of disease, which in its day played a part comparable to that played in more recent times by the germ theory of disease. This worm theory had for its basis the fact that worms are obviously associated with numerous and varied forms of disease. Here was something tangible to which the medical men of those remote times could trace certain baneful results. This was before the invention of the microscope, and it was not unnatural that, in the absence of microscopes to reveal the enormous prevalence of micro-organisms, there should spring up and become widely accepted

a theory that worms were a general cause of disease, and that even those diseases not obviously due to this cause were in reality due to it through some means not yet understood. Of all the organisms that inhabit the human body none are more prominent or more likely to come under the observation of the physician than certain of our nematode parasites—indeed a knowledge of these nematodes and their injurious effects may well antedate history.

The squeamish reader will not enjoy a paragraph which tells of the details and abundance of these parasites in human beings and the lower animals. I have removed from the stomach of a wallaby weighing not over 50 pounds no less than 40,000 nematodes varying in length from a few millimeters to several inches. As for human beings, there are regions where the inhabitants are pot-bellied owing to nematode infestation and where it is not an unheard-of thing for an infested individual to vomit a pint or more of "stomach worms"—parasitic nematodes infesting the human stomach. Such conditions are most prevalent among savages and ignorant people, and it is readily believable that in ancient times the conditions were more favorable to these parasites than they are to-day. Hence, it is easy to understand how a theory of disease based on the prevalence of nematodes could have arisen and gained a wide currency.

In modern times we have come to know much more about such diseases and that parasitic species of nematodes cause many diseases of mankind not formerly recognized. The dreaded "hookworm" is a nematode. So is that scourge of the Tropics, the "guinea worm." Trichina,[1] costing civilized nations hundreds of thousands of dollars yearly for the inspection of pork, is a nematode. If raw or insufficiently cooked trichina-infested pork be eaten by human beings, the result is a serious, oftentimes fatal, sickness called trichinosis, epidemics of which have claimed victims by the hundred. Nematodes have recently been suspected, with good show of of reason, of being carriers of cancer. So the list of more or less serious human nematode diseases and ailments might be increased until practically half a hundred had been enumerated.

[1] Trichinella spiralis.

No less serious are the nematode diseases of plants and of the lower animals. The common gallworm has been found infesting the roots of several hundred different species of plants, among them most of our cultivated crops, and causes an annual loss amounting to millions of dollars. There is another nematode that has at times completely checked the growing of sugar beets in certain regions. The list of serious diseases of this character could easily be increased to dozens. The same is true of animals. Every domestic species, and doubtless every wild, has a number of specific nematode parasites sapping its vitality.

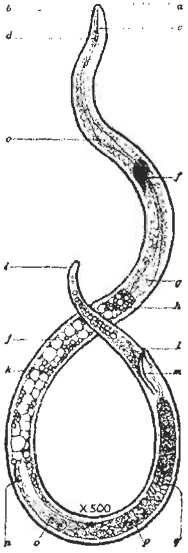


FIG. 33.—One of the injurious parasitic nematodes found in and on the roots of citrus trees, *Tylenchulus semipenetrans.* This is a male. It is the females of this species that are most injurious to the citrus roots. This parasite has been spread throughout the world on the roots of citrus nursery stock. Its original habitat is probably southeastern Asia, whence came our cultivated species of citrus. The females are much larger and penetrate for half their length into the citrus rootlets, leaving the posterior saccate part, devoted to the production of eggs, outside the roots. A new generation is produced every few weeks. These nematodes are devoured by another nematode shown in figure 20, a beneficial species, which hunts and devours this citrus parasite. This is a lateral view of a full-grown male. The spear is usually very inconspicuous—always deteriorated. Note also the deteriorated median bulb, sometimes apparently absent. In the male, in contrast with the female, the anus develops. *a*, Lip region; *b*, spear; *c*, 3-bulbed base of spear; *d*, esophageal lumen; *e*, median esophageal bulb; *f*, nerve ring; *g*, cardiac esophageal bulb; *h*, beginning of the intestine; *i*, terminus; *j*, large intestinal granule; *k*, small intestinal granule; *l*, anus; *m*, spicula; *n*, excretory pore; *o*, spermatocyte; *p*, vas deferens; *q*, spermatozoon.

THE VAST NUMBER OF UNKNOWN SPECIES.

The number of nematode species in existence must be enormously greater than is commonly supposed. Since most species of vertebrates are infested by one or more species of nematode, and with relatively few exceptions a given parasitic nematode infests but one host, it may be

estimated that more than 80,000 nematode species infest the forty-odd thousand species of vertebrates. Insects, much infested, will add many thousands of other species. The mollusks, crustaceans, and various groups of worms are also infested, and investigation continues from these sources also to augment the number of known species of parasitic nematodes.

Numerous as the parasitic species are, it is certain that the species of nematodes living free in soil and in water far outnumber them; and the number of free-living individuals is

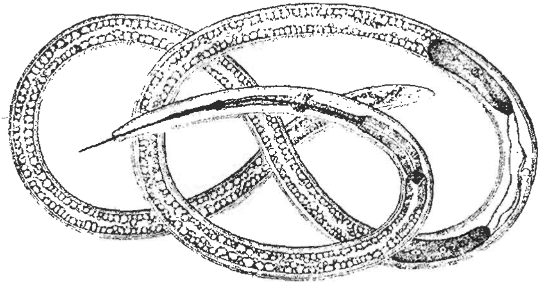


FIG. 34.—*This little serpentine monster, the dagger nematode (Xiphinema) is able to coil itself* about the rootlets of plants in such a way as to use efficiently its very long and slender spear, *which can be thrust far into the root tissues. The spear is clearly to be seen; its more slender anterior part is exserted.* This species is found in all parts of the United States and is a representative of an injurious genus, found in many parts of the world. *It is able to pierce* tougher and more corky roots than those nematodes which are armed with less formidable spears.

so great that they probably constitute one of the important mechanical as well as biological factors in soil and in the bottoms of lakes and oceans. Estimates based on the writer's investigations show that in the upper foot of an arable soil the number of nematodes runs to thousands of millions per acre. Aquatic nematode species exist in enormous numbers in both fresh and salt water, while the number of individuals is past computation.

Of course these large figures are the results of estimates, but the estimates are based carefully on past experience, and they are, moreover, being continually justified by inves-

tigations now in progress. A short time ago the writer agreed to prepare a nematode chapter for a college text-book devoted to North American fresh-water organisms. On looking up the literature it was found that there was not a single adequately described North American species of fresh-water nematode. There was little time or opportunity to search specially for these fresh-water forms, and yet it has been possible in this short time to discover about a hundred hitherto unknown kinds representing 30 genera. This ready assembling of so many different genera and species is fresh evidence of the enormous abundance and multifarious nature of these organisms. No doubt there is a horde of species awaiting discovery in North American waters.

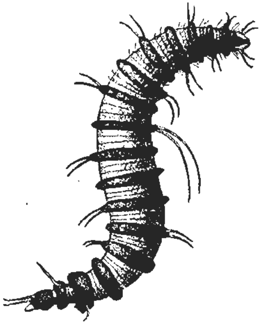


FIG. 35.—The banded nematode, Desmoscolex, one of a rather extensive group, not until 1889 definitely recognized by anyone as nematodes. Their internal organization is concealed beneath a rather opaque cuticle. Their internal anatomy is of a typical nematode character.

Something over a year ago a new genus of nematodes was found attacking citrus roots in California. Within six months this newly discovered citrus parasite was located in such widely scattered regions as California, Florida, Spain, Malta, Palestine, and Australia, showing, incidentally, that the parasite is one that has probably long infested the citrus species and inadvertently has been carried in nursery stock to many different parts of the world from its original habitat, which is most probably the original habitat of the cultivated citrus species themselves—southern Asia. Here again the investigations have disclosed a large number of new species, toward 100 in fact, assembled on and about the roots of citrus trees in various parts of the world.

These are not isolated and exceptional instances, but typical cases. It will be seen, therefore, that it is something more than a mere reconnoissance that leads me to the con-

clusion that over nine-tenths of the nematode species still remain unknown, a greater disproportion between the known and the unknown than exists in almost any other class of organisms.

There must be hundreds of thousands of species of nematodes. Of this vast number only a very few thousand have been investigated, and of these, comparatively few with any degree of thoroughness.

WONDERFUL VARIETY OF HABITAT.

Not the least interesting thing about nematodes is the astounding variety of their habitats. They occur in arid deserts and at the bottoms of lakes and rivers, in the waters of hot springs and in polar seas where the temperature is constantly below the freezing point of fresh water. They were thawed out alive from Antarctic ice in the far south by members of the Shackleton expedition. They occur at enormous depths in Alpine lakes and in the ocean. As parasites of fishes they traverse the seas; as parasites of birds they float across continents and over high mountain ranges. Their eggs and larvæ, invariably of microscopic size, are carried from place to place by an exceedingly great variety of agencies. Almost any visible thing that moves is capable of transporting nematode eggs or larvæ. Sometimes the eggs and larvæ are so resistant to dryness that long after conversion to dust they may revive when moistened. This revival of "mummified" nematodes may take place after as long a period as a quarter of a century.

Nematodes are found in queer places. The wildest imagination could hardly outpicture the facts. One species is found in the vermiform appendix of man; another has its adult form only in the seeds of wheat. A third form occurs in the felt mats on which the Germans are accustomed to set their mugs of beer, and has thus far been found in no other habitat. On the feet of birds and insects the eggs, larvæ, and adults of certain nematodes are carried to the tops of the tallest trees. The sour sap issuing from the wounds of a tree, often many feet above the ground, not infrequently contains nematodes that are specific to the wounds of that particular kind of tree. The tap water of

even well-conducted cities often contains nematodes, for nematodes are common in the potable water of our lakes and rivers.

ABUNDANCE OF NEMATODES.

Nematodes, therefore, are extremely widespread, and to be found in most unexpected places; they are also inconceivably abundant. We little realize the enormous numbers in which these organisms exist all about us, wherever we go, by land or sea. A thimbleful of mud from the bottom of river or ocean may contain hundreds of specimens. The nematodes from a 10-acre field, if arranged single file, would form a procession long enough to reach around the world. A lump of soil no larger than the end of one's thumb may contain hundreds, even thousands of nematodes, and yet present few points that would distinguish it from a lump of soil destitute of these organisms. As nematodes are usually very prolific, a single female ofttimes producing thousands of eggs, the number of eggs vastly exceeds that of the adults.

In short, if all the matter in the universe except the nematodes were swept away, our world would still be dimly recognizable, and if, as disembodied spirits, we could then investigate it, we should find its mountains, hills, vales, rivers, lakes, and oceans represented by a film of nematodes. The location of towns would be decipherable, since for every massing of human beings there would be a corresponding massing of certain nematodes. Trees would still stand in ghostly rows representing our streets and highways. The location of the various plants and animals would still be decipherable, and, had we sufficient knowledge, in many cases even their species could be determined by an examination of their erstwhile nematode parasites.

We must therefore conceive of nematodes and their eggs as almost omnipresent, as being carried by the wind and by flying birds and running animals; as floating from place to place in nearly all the waters of the earth; and as shipped from point to point throughout the civilized world in vehicles of traffic.

It is interesting to speculate on what would happen if any great group of plants or animals were utterly destroyed,

and such a speculation may serve to throw light on the relative or economic importance of the group. We find microscopic plants living in the sea deriving their sustenance from material they find dissolved in the sea water. These microscopic plants become the food of microscopic animals. The microscopic animals become the food of others of larger size, and so the series continues until it culminates in the great monsters of the deep. These in turn when they die may become dissolved in the sea water, and the material that constituted their bodies may again be taken up by the microscopic plants.

Tiny diatomaceous plants derive their sustenance from sea water, nematodes feed upon the diatoms, fishes upon the nematodes. What would happen if any link in such a chain were destroyed? It is quite conceivable that the destruction of the nematodes might partially depopulate the ocean. Could something of this sort possibly happen in the soil if its nematode millions were suddenly destroyed? It is conceivable, but we do not know.

PREVALENT ERRORS WITH REGARD TO NEMATODES.

The prevalent conception of the nematode organization, even that prevalent among scientific men, is full of errors. These errors glare at us even from the pages of practically all our most modern textbooks and encyclopedias. These misconceptions have arisen in a natural way, because our attention has been largely focused upon the parasitic nematodes. These parasitic species are simple in their external structure, and while vastly larger in body than most of the free-living species, are yet so small that the difficulties of dissection are great if not insuperable. Accordingly, studies have been carried on largely with the aid of thin slices made with the microtome, a method both tedious and difficult. Progress has therefore been relatively slow. so that our knowledge even of these deteriorated parasitic species is often unsatisfactory.

It is a general law that parasitic species become more or less degenerate. Depending as they do upon their host for food and other things, they tend to lose the various organs that would be necessary to them if they led a more active existence. Thus it is that we have parasitic insect forms so

degenorate that they possess neither wings nor legs. Their eyes are rudimentary, as are also their antennæ and mouth parts. They are reduced to comparatively motionless wormlike or saccate nearly colorless structures with few of the appendages that form so conspicuous a part of the anatomy of an ordinary insect.

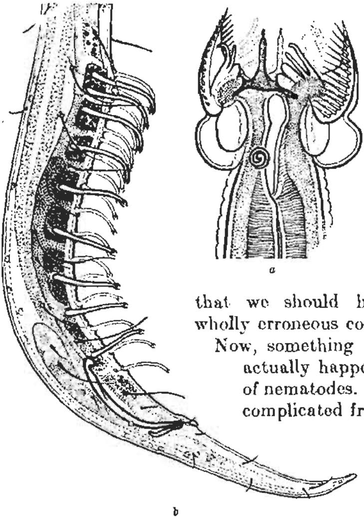


FIG. 36.—Head (*a*) and tail end (*b*) of two different nematodes, illustrating the complicated anatomy of free-living species. Compare these with the relatively simple parasitic forms shown in figure 37. It is by a study of free-living forms that we shall finally arrive at a just conception of nematode morphology.

What would be our conception of the insect group as a whole if our knowledge was largely confined to these simple and degenerate parasitic forms? It is easy to see that we should have derived a wholly erroneous conception.

Now, something of this sort has actually happened in the case of nematodes. While the more complicated free-living species outnumber the parasitic species ten to one, our knowledge of them has lagged far behind that of the parasites, partly because they are minute and hidden away in unexplored locations, and partly because of certain difficulties due to such a peculiarly impenetrable cuticle that it is very difficult to prepare satisfactory material for technical examination.

We have seen that the nematode organism is comparatively complex; at the same time it is almost impossible to determine

the function of some of the organs because of our inability to make observations under natural conditions. The problem of studying nematode habits and functions is in some respects similar to that which confronts the geologist in his attempts to form mental pictures of organic activities which took place in remote ages. The geologist must study the relationship of more or less fragmentary elements in a dead condition, and imagine what would happen if these fragments were endowed with life similar to that which comes within our experience in the world as at present constituted. It is somewhat the same with the nematode anatomy. We have before us for study a structure, sometimes living, but more often dead, whose functions we have to surmise on the basis of analogous structures which we may fairly assume to act in accordance with methods to which we are accustomed in a general way, in living organisms of another character and belonging to another group.

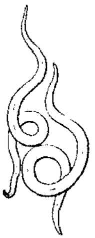


FIG. 37.—Two parasitic nematodes, a male and a female. These are typical parasitic nematodes and represent the ordinary conception of what a nematode is like. We have been misled with regard to nematodes; they are by no means so simple in form as a consideration of the parasitic species would lead us to believe. Compare this illustration with figure 36 which represents free-living nematode forms. The complicated free-living forms more nearly represent the typical nematode structure.

Small wonder then that such conceptions as we have should often prove grossly incorrect. The prevalent idea of the external appearance of a nematode, even among scientists, it is safe to say, approximates to that illustrated in figure 37. As a matter of fact, however, the illustrations on the opposite page are quite as near the truth.

WHAT NEMATODES ARE LIKE; HOW TO FIND AND RECOGNIZE FREE-LIVING NEMATODES.

In answer to the question "What are nematodes like," we can only reply that they do not closely resemble any other organisms. While they constitute a group more widely spread than almost any other, and are numbered by countless millions, their relationship to the rest of the organic world yet remains more or less of a riddle. We may compare

the nematodes to an isolated oceanic island whose relation to distant islands and continents remains problematical.

Studying the affinities of insects, for example, it is easy to show that they are more or less closely related to spiders, centipedes, and crabs, and these in their turn to other great groups. Not so with nematodes. There is not another group, great or small, to which they are known to be very closely allied. This isolation in the present organic world is one of the facts that may be used as an argument for the great antiquity of the group. Nevertheless, there is an entire

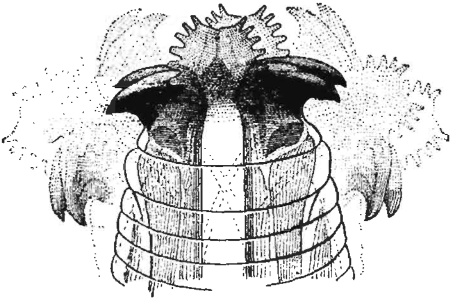


FIG. 38.—Head end of the double-digger, or Diploscapter. This remarkable nematode hooks its way through the soil and tissues of diseased plants by means of a solid piece of armor on the front of its head. With this weapon it can chop both ways, first down and then up. The extreme positions of the digging apparatus are shown by the dotted portions of the figure. With each swing of its head the double-digger hooks its way forward.

absence of evidence that would afford direct proof of great antiquity. No fossil nematodes are known.

HOW TO RECOGNIZE NEMATODES.

Practically any collection of soil, or any collection of sand, mud, or débris from standing or from running water, in any part of the world, will yield, on examination in water with a hand lens, small slender organisms which whip themselves about by means of more or less rapid contortions of the whole body. This type of movement identifies them as nematodes and differs from the movements of other small organisms of similar form in that, though often vigorous and conspicuous,

it is in one plane only, the dorso-ventral plane of the body, and in that, unlike worms, the length and proportions of the body meanwhile remain unchanged. In a clear liquid, moreover, this thrashing about seems, as a rule, to produce no locomotion; the nematode remains in about the same spot unless it works its way in among vegetation, débris, or particles of soil. It needs the friction of external matter of this character in order to accomplish its normal locomotion. When quieted by stupefying, or killing, these nematodes are seen to be more or less cylindrical, unsegmented organisms, without locomotor appendages.

COLOR.

An internal examination shows that nearly all the tissues of nematodes are comparatively colorless and transparent, and whatever decided color the body possesses is usually confined to the intestinal region. The cells of the intestine itself are sometimes colored by the presence in them of organic granules of a yellowish, greenish, or brownish tint, and the middle portion of the body is thus made to appear yellowish, greenish, or brownish. The color of the ingested food, showing through the tissues of the body, is also sometimes a color factor; and as the food varies in color from nearly black to colorless, so the nematode is correspondingly tinted. Species feeding on the juices of plants are usually nearly colorless, e. g., species of Tylenchus and Aphelenchus. A considerable number of species possess colored eye spots near the head. In some species the œsophagus contains yellowish or brownish pigment.

HOW NEMATODES WORK.

In answer to the questions How is it that nematodes do so much harm? What are their methods? How do they work? it may be said they bite, puncture, gnaw, suck, and dig as do insects, for instance, but they do all these things with organs of an entirely different character.

The mechanisms with which they accomplish some of these results are very interesting and the study of them constitutes an important branch of nematology. Some of the forms are shown in figures 38, 39, 40, etc. When a nematode is possessed of definite jaws, these are usually three in number,

instead of two, as in most other animal groups, and act radially somewhat as do the jaws of a lathe chuck. The jaws are moved by relatively powerful muscles and often are armed with ferocious looking teeth, which can be used in a very effective way. (Figs. 42 and 44.)

Sometimes the mouth is armed with a sting or spear with which to puncture the tissues of the victim, preparatory to sucking away its vital fluids. In such cases, behind the spear and constituting a portion of the gullet, there is a relatively

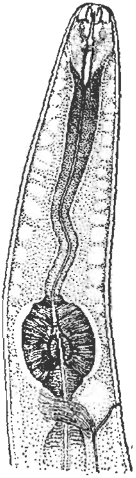


FIG. 39.—Head end of a spear-bearing nematode, showing how the spear mechanism works. The spear is shown with its acute point located in the midst of the lips, and appears in the illustration to be about one-fourth of an inch long. The spear is a hollow tube, and is connected with a very narrow chitinous duct which passes back through the esophagus and connects with the sucking bulb, which is in reality a kind of force pump. This ellipsoidal sucking bulb is shown near the bottom of the figure. The radiating lines shown in the bulb represent muscular fibers. When these fibers contract they open the central valve of the bulb and thus create a vacuum cavity; this in turn creates suction, which extends forward through the narrow tube just mentioned, and so on to the spear, and hence to the lips. If the lips are placed against a moist surface, such as the rootlet of a plant, and the suction pump be then brought into action, the lips become fastened to the moist surface by suction. The lips being now firmly attached, the spear can be brought into play by the contraction of the muscles attached to its base. These are shown surrounding the spear, and are attached to the base of the spear at one end and extend obliquely forward to the base of the lips, where they have their anterior attachment. The contraction of these relatively powerful muscles drives the spear forward and thrusts its point into the tissues fastened against the lips. The suction of the bulb next causes the fluid contents of the cells pierced by the spear to flow through the spear into the esophagus and thence into the pump, which, being a force pump, forces it on into the intestine not shown in the figure.

powerful pump or sucking bulb. The nematode applies its lips to the object to be punctured, exerts suction by means of its muscular pump, thus attaching its lips firmly, and then thrusts its spear through the mouth opening so as to puncture or batter down the tissue containing its food, or through which it wishes to pass. (Fig. 39.)

There is a series of remarkable species inhabiting the soils of our meadows and swamps which possess a powerful spear but no pump. They have developed another and very

efficient method of using their spears. These little Iotas, as I have called them, are covered with projecting, retrorse scales, or prickles, so that it is with difficulty that they move in any other direction than forward. Every movement of their bodies drives them in a more or less forthright way through the soil. Coming against the root of a plant, their muscular movements push the head firmly against the surface of the root,

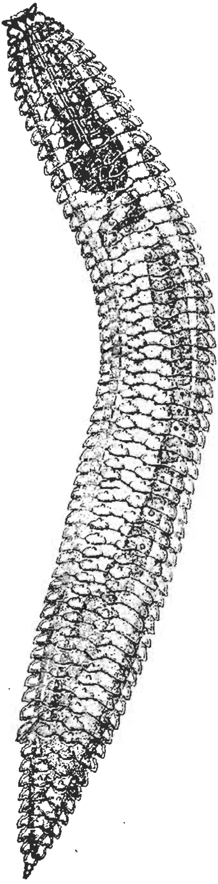


FIG. 40.—One of the scaly little monsters frequenting the soils of our meadows and swamps. These are known as Iotas. They are covered with retrorse scales, or bristles, so that it is practically impossible for them to move in any other direction than forward. Near the head the remarkably large and powerful spear can be seen through the skin. When, in order to make punctures, this spear is thrust out, the nematode is not pushed backward, because of the friction which its scales offer to surrounding soil particles. There are many kinds of Iotas, and all of them appear to be injurious.

so that the spear when thrust forth acts from a well-supported base, namely, the friction of the surface of the body against the surrounding soil material.

Sometimes the secretions or excretions of nematodes are irritating or poisonous, so that their presence in the tissues of animals or plants causes abnormal swellings, or galls. Their presence in the tissues of animals may cause anemia and lassitude, or muscular pains and fever, to say nothing of

special swellings, abscesses, punctured blood vessels, paralysis, and insanity.

RELATIONSHIP TO FERTILITY AND BIOLOGY OF THE SOIL.

Notwithstanding the enormous number of nematodes existing in every acre of arable soil, the actual volume and weight of the material composing the nematodes is relatively small. We can not yet positively assert that they assist materially in the fertilization of the soil; it is, however, easily conceivable, in fact, there is a certain amount of evidence for the idea, that, indirectly, some species may be of considerable importance in maintaining or assisting to maintain a fertile condition. Unfortunately, however, we are here driven to speculate on data that are anything but full and satisfactory.

We must have some general notion, not only of the extent of the nematode population of the soil, but also of its composition, before we shall be in a position to do more than reason in a vague and unsatisfactory way upon this subject. We need hundreds of investigators where now there are none, and if these investigators should devote their time for years to come to this subject alone it would only be after a considerable lapse of time that our knowledge of these nematode legions would be sufficient to enable us to reach reliable general conclusions.

Since the great majority of the nematodes inhabiting the soil are armed with an oral spear, whose sole function, as far as we know, is to puncture other organisms, either animals or plants, presumably plants, we may be strongly convinced that they are on the whole injurious to the roots of the higher plants. In specific cases we have positive proof that this general belief is entirely correct. There are species of spear-bearing nematodes which, by their injurious effects on the roots of plants, cause an annual loss amounting to millions of dollars. It is quite reasonable to suppose that the nematode punctures, even when themselves not a serious setback to the plant that is attacked, nevertheless form a highway for the entrance of other organisms, such as injurious microbes and fungi. In some such way we may account for the enormous mortality of roots. It is an interesting fact that crop

plants in what we call good condition are found ofttimes to have a large fraction of their roots in a decayed and useless state. In such cases, where a root is destroyed, often the plant throws out another root higher up on the same axis, and in this way continues to derive its nourishment from the soil. If the plant were freed from the necessity of constantly supplying new roots in place of those killed off, to what extent would this release affect the aerial part of the plant?

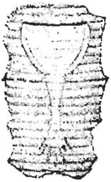
Cases are on record, and they are increasing in number, in which it has been observed that if the soil be thoroughly sterlized, and therefore freed, among other things, of its nematode population, and be afterwards inoculated with those microorganisms which are known to be necessary to the health of growing plants, plants reared in it flourish remarkably. May not this luxuriance be due to freedom from injurious underground conditions, prominent among which, we may easily imagine, are the attacks of certain nematodes?

Though nematodes are small they are scattered through the soil in countless myriads in such a way that they must constitute an important mechanical factor. From the time they are hatched until death ensues nematodes seem to be in constant motion. There is no evidence that they sleep, and they rarely remain stationary for more than a few seconds at a time, at least under the conditions in which they come to our notice. Such active organisms, existing as they do in every acre of arable soil in thousands of millions, must exert a more or less powerful mechanical influence.

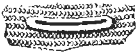
MYSTERIOUS ORGANS—THE AMPHIDS.

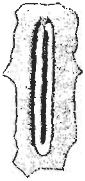
Attention has already been called to the fact that nematodes possess organs the use of which we have been unable to guess. The organs which I have called amphids, occurring as rights and lefts like ears, one on either side of the head, are almost universally present in free-living nematodes. These amphids vary remarkably in size and form (fig. 16), but not much in position. Their regular occurrence in such a prominent location makes it exceedingly probable that they serve some important purpose, but what that purpose is we have not yet discovered. It is suggested by one that

they are organs of hearing, and by another that they are breathing organs. It is quite conceivable that they are organs of orientation; that is, organs by which the animal knows what its position is with reference to the action of gravitation—knows when it is right side up. Such organs of orientation occur in higher animals, and are absolutely essential to their well being.



It is possible that the amphids have to do with sensations or functions of which we can form no clear idea. Mark the difficulties that accompany the investigation of such a matter. How are we to interpret the actions of a nematode when trying to determine its sensations and motives, especially if, as is not at all impossible, it is capable of sensations so different from our own that we can not even conceive of them? We have no trouble in proving that a dog hears with his ears as we do. Dissection shows the structure of his ears to be closely like that of our own. We observe how he reacts to various sounds—how he pricks up his ears at a familiar call, or how he fails to hear when his ears are in an unhealthy state. In these observations we are guided by the dog's actions, which we interpret in accordance with our knowledge of our own feelings and actions under similar circumstances. But how can we prove that a nematode hears? How will it act if it does hear?





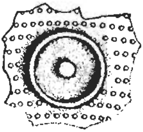


FIG. 41.—Six different forms of the peculiar organs called amphids, almost universally present on the heads of the free-living nematodes. These organs are one of the mysteries of nematology. Nobody knows what they are for. They occur like ears, one on each side near the head end. Sometimes they are of relatively large size.

It is true we can show after a fashion that nematodes, or at least some of them, feel, see, taste, and smell, though in these last two cases there is some doubt as to particulars; that is to say, they act under appropriate circumstances as we imagine they would act if they could feel, see, taste, and smell somewhat after the human fashion. Moreover, we have located and studied the organs through which these sensations may probably be received. But no one has proved that nematodes hear.

As might be surmised from the fact that nematodes live under such a great variety of conditions, their food is extremely varied. Among the parasites, some feed upon living blood, others upon various animal serums and secretions. The plant parasites feed upon the sap and protoplasm found in the tissues of the host plants. The free-living sorts sometimes feed upon small organisms of various kinds—microbes, algæ, the mycelium and spores of fungi, etc., each species having its own particular preferences. Few are omnivorous. Some species found in mud and slime extract food and nutriment therefrom, somewhat as earthworms do, by swallowing material indiscriminately.

NEMATODES IN TREES; HOW DO THEY GET THERE?

The nematode population of trees is worthy of account. It is not generally known, in fact it is practically unknown, that nematodes are found in trees, even to their very tops. Their microscopic eggs and larvæ are carried thither by currents of air, by insects, by birds, and by climbing animals; or, keeping pace with the growth of the tree, the nematodes may reach these high locations by their own efforts. Each kind of tree may have its own peculiar fauna. It is well known that nematodes are the cause of swellings or galls on the aerial parts of plants as well as on their roots. These galls have been a subject of interest for a long time, and have been described and figured in scientific and horticultural publications for half a century or more, but it is only recently that we have come to understand how extensive is the nematode tree population apart from the producers of galls. The crevices in the bark, the natural clefts in the axils of branches and leaves, all furnish suitable lodgment for nematodes, and the nematodes are there, no doubt often

harmless, beyond doubt also sometimes detrimental. A few examples may be cited to illustrate this fact.

Not long ago I had occasion to examine some diseased apples which grew high up on an old apple tree, some 20 to 30 feet from the ground. I found the apples infested by nematodes. By experiment I proved that wasps and other insects carried the eggs and larvæ of the nematodes from apple to apple on the tree, and from apples on the ground to others on the tree. The intensity of the infestation may be judged from the fact that a single apple contained nematodes to the number of about 90,000. These were of several different species, some of which were well adapted for forcing their way unaided into the apples, that is to say, were armed with mouth parts specially adapted to puncturing and battering down vegetable tissue. Others belonged to genera characterized by the secretion or excretion of material which appears to aid in dissolving vegetable tissues.

FIG. 42.—Front view of a nematode monster which feeds upon others of its kind. The drawing of the head is correct in every particular. The body has been sketched by the artist to assist the imagination in picturing how one of these organisms looks when seen from in front. The artist's conception is undoubtedly very nearly correct. It will be seen that this little monster possesses three jaws, as do most nematodes. This gives to the mouth opening and pharynx of these organisms a peculiar three-angled or three-sided appearance. The jaws are nearly always of practically equal size, although one of them is morphologically equivalent to the other two.

On another occasion, an examination of the "sap" issuing from a wound in a chestnut tree, high above the ground, showed that this liquid or semiliquid substance was swarming with nematodes.

Finally, an examination of galls of unknown origin on a chestnut oak showed them to be regularly inhabited by no less than four different species of nematodes, some of which were of so peculiar a character as to strongly suggest that these galls are their normal habitat.

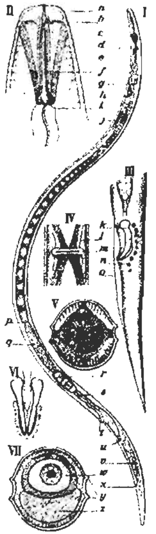


Fig. 43.—The devastating nematode of the onion and other bulbous crops (*Tylenchus devastatrix*). This nematode has caused enormous damage in the Netherlands and other parts of Europe, where it attacks the onion, hyacinth, and numerous other plants. It has been known for a long time in Europe and Australia; no means have yet been devised by which it can be eradicated. Recently it has been found also in the United States. It is one of the species which puncture the tissues of plants by means of a long, narrow, tubular sting, or spear, located in the mouth. *I*, A female; *II*, head of the same more highly magnified, the spear is most clearly shown; *III*, tail of a male; *IV*, vulva from below; *V*, cross section of the neck passing through the sucking bulb; *VI*, front view of the spicula and accessory parts; *VII*, cross section through the middle of a female, showing how the body cavity is filled completely by the ovary (*w*) and the intestine (*z*). *a*, Lip region; *b*, tip of spear; *c*, medium sucking bulb; *d*, nerve ring; *e*, excretory pore; *f*, muscles for protruding the spear; *g*, posterior esophageal swelling; *h*, excretory gland; *i*, hind end of spear; *j*, loop in ovary; *k*, spiculum, or penis; *l*, muscles for opening the vulva; *m*, the vulva; *n*, glandular (?) bodies; *o*, bursa; *p*, hind end of ovary; *q*, uterus containing spermatozoa and a segmenting egg (at *r*); *r*, segmenting egg; *s*, vagina; *t*, the vulva or female sexual opening; *u*, blind end of posterior rudimentary ovary; *v*, intestine, showing its cellular structure; *w*, cross section of an egg; *x*, anus; *y*, wings of the cuticle; *z*, cross section of the intestine.

Such cases, selected more or less at random from those under investigation, are entirely typical and show conclusively that our cultivated and forest trees from their roots to their tops furnish lodgement and food for nematodes peculiar to the situation.

EGGS ALWAYS MICROSCOPIC.

A most striking and important matter connected with the life history of nematodes is the fact that the eggs are always microscopic. There are nematodes which reach a length of

several feet, yet their generative cells are always exceedingly minute, comparable indeed with the spores of fungi, or even with the larger microbes. This fact, together with the enormous number of the eggs, is one of the most important things to remember in connection with sanitary measures directed toward diseases caused by these organisms. We have to remember that they do not necessarily indicate their presence by anything that we can see. One contracts hookworm disease as one contracts typhoid, through an invisible agency composed of microscopic elements capable of causing the disease. A field of beets, onions, or potatoes becomes infested, it may be, from invisible eggs or larvæ planted with the seed. The eggs or larvæ of nematodes may be transferred in all the numberless ways rendered possible by their microscopic size.

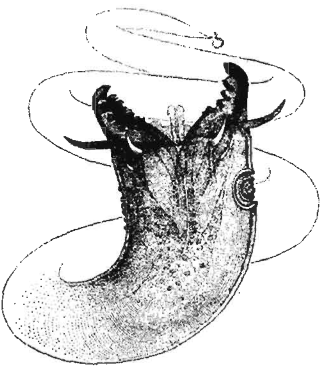


FIG. 44.—The shark nematode, Selachinema. This rapacious little monster preys on other nematodes. The specimen from which the illustration was derived may have had an accident, as one of the jaws, that on the far side, appears to be missing. This nematode has been called the shark nematode on account of the rows of ferocious-looking, backward-pointing teeth with which its jaws are armed.

The difference between the size of the parent and its offspring is often very great. There is a little nematode common in our brooks and ponds that has a total length of about a millimeter. These little specks are the source of another generation in which each individual is a thousandfold larger than either of its parents.

LENGTH OF LIFE.

How long does a nematode live? Easy to ask, difficult to answer. How long does a vertebrate live? It depends on the vertebrate, whether it be a mouse or an elephant. The

nematodes constitute a group probably ten times more numerous in species than the vertebrates, and are correspondingly varied in their size, habits, and life history, and, naturally enough, vary also in the age to which they live. It is certain that the eggs and larvæ of some species of nematodes will remain alive under suitable conditions for a very long time. The larvæ of certain nematode parasites have been known to remain alive in a dry condition for approximately a quarter of a century.

Certain forms parasitic in animals require more than one host for their full development. They enter the first host in a larval condition and after certain changes encyst themselves in the tissues of this host and enter upon a period of quiescence, which no doubt may last in some cases for several years, though just how long we do not know. These encysted larval forms will not continue their development until their primary host is devoured by a second host, as a wolf devours a pig, or a bird an insect. On entering the second host the encysted larval forms develop, produce young, and die. Here we have a series of events which normally occupies several years and represents the lifetime of the parasite.

REMARKABLE INSTINCTS.

Certain other nematodes escape from their host in the form of eggs or larvæ and in this condition will remain alive for a considerable length of time, it may be months, it may be years. During all this time they undergo very little change, and yet upon the arrival of suitable conditions they immediately spring into activity: I may illustrate this point by an account of experiments I once made with eggs of the ordinary Oxyuris of man. The eggs of this parasite on leaving the host often contain immature embryos. These embryos will grow slowly in water and other liquid media, but will not rupture the egg shell. I endeavored to assist their escape by cultivation in a great variety of artificial digestive fluids such as pepsin, but all to no purpose; and yet when these eggs were placed in a capsule and swallowed under such conditions that the action of the stomach would cause the capsule to be promptly supplied with fresh normal human digestive fluid at body temperature, the eggs hatched in a

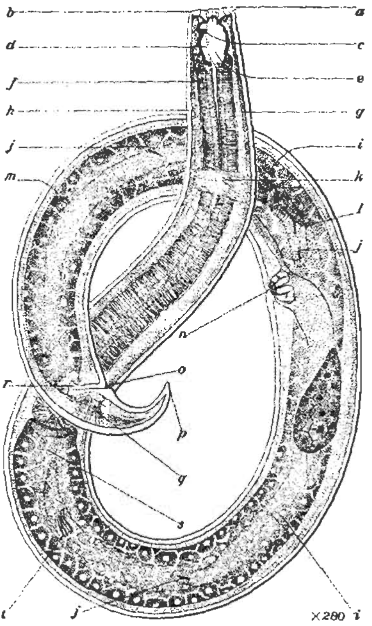


FIG. 45.—This savage little monster is found on or near the roots of plants, where it moves about actively thrusting its head hither and thither with an almost inconceivably rapid motion, hunting other nematodes, which it swallows whole. In the individual illustrated the remains of several victims can be seen through the rather transparent walls of the intestine. This is a beneficial nematode, the *Mononchus papillatus* of Bastian. It has been found feeding upon Tylenchulus, another nematode injurious to the roots of citrus trees. The illustration shows a rather immature femal especimen which has been feeding upon *Tylenchulus semipenetrans*. The remains of three or four Tylenchuli are to be seen in the intestine. *a*, Two of the innervated papillæ existing on one of the six mobile lips; *b*, one of the lips; *c*, dorsal pharyngeal tooth; *d* one of the three longitudinal chitinous ribs of the pharynx; *e*, pharyngeal cavity; *f*, esophagus; *g*, muscular layer of the body; *h*, cuticle; *i*, one of the cells of the intestine; *j*, *j*, *j*, oral spears of three ingested Tylenchuli, the spear in the intestine near the vulva is accompanied by an undigested portion of the lining of the esophagus of the Tylenchulus; *k*, nerve ring; *l*, blind end of the anterior ovary, which, being behind the intestine, shows less clearly than the posterior ovary; *m*, nucleus of one of the intestinal cells; *n*, vulva; *o*, anus; *p*, terminus; *q*, anal muscles; *r*, rectum; *s*, cardia; *t*, spicula of an ingested male Tylenchulus, the outlines of the undigested tail end of which are to be seen faintly.

few hours. So it is with many other nematode parasites. They promptly recognize the specific conditions necessary to their further development, but until those particular conditions are fulfilled they remain quiescent. These quiescent periods, of course, are an element in the age to which the individual lives. Thus it is that while some nematodes mature and die in a very few days, others may live for many years.

Attention has already been called to the fact that nematodes feed upon other organisms. In this way they may be either injurious or beneficial; the net result from an economic standpoint depends on whether the organism devoured is itself harmful or beneficial. There is a nematode that feeds upon the roots of citrus trees and is therefore injurious. (Fig. 33.) Living in the orchards with this first and harmful species is a second nematode that regularly feeds upon the first, and is therefore beneficial, doing the orange grower a good service. (Fig. 45.) Many injurious insects passing a part of their life in the soil, such as wireworms and cutworms, are infested with nematode parasites. These parasites in their larval stage inhabit the soil, where they are picked up by succeeding generations of the insect larvæ. In so far as these parasitic nematodes are injurious to the cutworms they are helpful to the farmer.

Some nematodes therefore are beneficial. We do not know much about these beneficial species, but enough to render the prospect alluring. We know that some of them, especially those living in the soil and in water, feed upon baneful microorganisms such as injurious microbes and fungi, and even upon other nematodes. Doubtless the relationships among these various microorganisms of the soil are as varied and intricate as we know them to be among larger organisms.

Of course it does not necessarily follow that because a soil-inhabiting nematode feeds upon injurious microorganisms it is, therefore, necessarily beneficial, for while feeding on the micro-organisms it may be the means of transporting and transplanting them, just as birds and animals feeding upon obnoxious plants may become a means of distributing the seeds. The subject is full of intricacies.

NEMATOLOGY.

The foregoing fragmentary sketch may indicat student, as well as to the general reader, the vast n nematodes that exist, the enormous variety of the and the intricate and important relationships they mankind and the rest of creation. They offer an ex field of study; and probably constitute almost great organic group worthy of a separate branch of l science comparable with entomology—nematology.

EDIBLE SNAILS.

By E. W. Rust,
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INTRODUCTION.

FOR many years edible snails have had a place upon the menu in various European countries, but it is in France that the greatest numbers are now consumed. It must not be inferred, however, that snail culture originated in the above-named country, for Pliny the elder tells us that a certain Fulvius Hirpinus first instituted snail preserves at Tarquinium, a Tuscan city not far from Rome, about 50 B. C. There the mollusks were guarded in inclosures and fed on meal and boiled wine until fat enough for use. By a combination of careful breeding, selection, and feeding, very satisfactory results were attained, and we read that the snails attained a large size and very agreeable flavor.

During the growth and expansion of the Roman Empire snail culture was introduced into the countries subjugated by the Cæsars, and in this manner the industry became established in Switzerland and in the provinces bordering on the Danube, where it was still flourishing during the Middle Ages. From Ulm, in the Swabian Alps, 10,000,000 snails were annually sent down the Danube to Vienna and the Austrian convents, where they were eaten under the name of fish during the lenten season.

With the ultimate extinction of cheap water transportation this market was lost, but the industry still persisted through many vicissitudes until a safe and sure market was found in France during the latter part of the eighteenth century. The introduction of the mollusks as an article of food was in the following rather haphazard manner: French wine merchants, who yearly went to Burgundy on buying trips, were compelled to stop at the posting inns, where they

[1] The writer wishes to express his appreciation of the advice of Dr. Paul Bartsch, curator of marine invertebrates at the U. S. National Museum, who not only corrected the manuscript of this paper, but also offered valuable suggestions during the preparation of the same.

were frequently served with snails gathered from the surrounding vineyards. This unusual but savory dish was commented upon by the merchants when they returned to their homes, and thus interest was gradually aroused to the point where one of the coaches plying between Paris and Auxerre was commissioned to bring the first baskets of snails to the French capital. About 1850 the trade in Burgundy snails was greatly stimulated by the advent of the railroad, for they could now be transported to greater distances while still fresh. Thus new markets were developed in France, Italy, and Spain. Snaileries have become common in many sections of central and southern France, northern and central Italy, Spain, throughout the Swabian Jura, Wurttemberg, Baden, and in the villages of the Danube and Lauter Valleys, the town of Gutenstein alone having gardens in which several million snails are fattened annually.

SPECIES EATEN.

In most critical markets the large, white snail (*Helix* (*Helicogena*) *pomatia* Linn.) is the one preferred, but the common garden snail (*Helix* [*Helicogena*] *aspersa* Muller) and the wood snail (*Helix* [*Tachea*] *nemoralis* Muller) are also widely eaten, especially by the poorer people, as they do not command the price which the former bring. In addition, *Helix* (*Tachea*) *hortensis* Muller, *Helix* (*Helicogena*) *aperta* Muller, *Helix* (*Euparypha*) *pisana* Muller, *Helix* (*Otala*) *vermiculata* Muller, and *Helix* (*Otala*) *lactea* Muller are all eaten to a greater or less extent in different places, while in and around Marseille *Helix* (*Helicogena*) *melanostoma* Draparnaud is preferred by the epicures. In Italy the edible snail is generally *Helix* (*Helicogena*) *lucorum* Linn., and in Mexico *H. aspersa* has been acclimatized, and an indigenous species (*Lysinoe humboldtiana buffoniana* Pfeiffer) is also eaten. In England a few snails are consumed, generally *H. pomatia* or *H. aspersa*, which latter is believed to be native to the island; while in the United States of America such snails as are found upon the market are usually *H. pomatia*, which are brought over from Europe alive in barrels and casks.

CLASSIFICATION AND GENERAL HABITS.

Many edible snails belong to the family Helicidæ, which are land snails, and most of those eaten by Caucasian races belong to the genus *Helix*. All are *hermaphrodites*, mostly with vegetarian tastes (but sometimes eating animal substances), found in woods, fields, gardens, cellars, old walls, or upon open plains, mountain sides, by bodies of fresh water, and near the sea. Most of the species are nocturnal and prefer shade and moisture, but some few emerge from their hiding places by day and seem to delight in the sunshine. All are protected by a spirally coiled, more or less globular shell, into which they can retire as occasion demands, the mouth of which may be sealed by a film or epiphragm excreted by the mantle. Furthermore, the body is protected by an exudation of slime, which serves not only to exclude the air, thus preventing a fatal amount of evaporation, but may also act as a deterrent to foes, such as birds and small mammals, which might otherwise prey upon them.

DESCRIPTION OF THE PRINCIPAL EDIBLE SPECIES.

(*Helix* [*Helicogena*] *pomatia* Linn.)

Body obtusely rounded in front, narrowing gradually behind to a slender tip, yellowish-gray, sometimes with a brownish cast, covered throughout with large oval, pale yellow granulations between which the dermis shows grayish; mantle (that part of the mollusk which secretes the shell and covers the visceral cavity) furnished on its upper part with three prominent, fleshy lobes; tentacles (feelers) two in number, long and cylindrical; eye-stalks two, each with a small globular eye at the end; foot (part of the body on which snails travel) large, broad, rounded in front and obtusely pointed behind.

Shell globular, thick, strong; whorls (turns of shell) four or five in number, well rounded, separated by a narrow suture (the line of junction between the whorls); umbilicus (perforation at base of shell) narrow and small; aperture (mouth of shell) nearly round; outer lip thick, usually reddish-brown inside, inner lip merely a callus covering the preceding whorl. In coloration the shell may be yellowish-white to brownish; usually banded with four to five brown

spirals on the last turn, which may converge and meet on the earlier whorls, where only two or three may be apparent. Sometimes this darker coloration becomes diffused and may cover more or less of the entire surface of the shell.

LIFE HISTORY.

As there is a great similarity in the life histories and general habits of all the edible Helicidæ, we may avoid unnecessary repetition by following the most important commercial species (*H. pomatia*) in its course of development.

During June or July the eggs, some 50 or 60 in number, are deposited. They are about the size of a small pea and greatly resemble mistletoe berries both in color and in consistency, or, as some one has remarked, might be mistaken for a homeopathic pill. A thin, globular, calcareous shell incloses the gelatinous portion of the eggs, which are laid in a cluster in a hole in the earth which the snail digs with its foot. Hatching takes place in about 20 days, and when the young emerge they immediately make their first meal from the pellicle of the egg just vacated. The shell of the newly hatched snail is very delicate and easily injured, but soon hardens in the air. Growth is very rapid, and by autumn they have attained the size of a large marble and are quite fat and well conditioned, as they have been eating ravenously preparatory to a long winter's fast. When the first frosts come these snails become inactive, almost cease eating, and congregate in masses. Then each one digs a hole with its foot just large enough to accommodate the shell, and after lining this hole with dead leaves and slime from its mantle, the mollusk turns the mouth of its shell upward and closes the aperture with a thick calcareous lid called an epiphragm, which is excreted by the mantle. Thus protected from the elements all bodily functions are suspended, and the inmate passes the winter in a torpid condition. With the advent of warm weather in the spring the epiphragm is thrown off and growth recommences. Copulation takes place during May or June and a few days later the eggs are laid. Although the snail is now sexually mature, it may not reach its maximum size until the second summer, when it should be from 1½ to 2¼ inches in height

and vary from creamy white to dark brown, either with or without stripes. The natural life of *H. pomatia* is about 6 or 8 years, and eggs are produced every summer.

COMMERCIAL PRODUCTION.

In Europe, when snails are raised commercially, they are placed in inclosures called "pens," "parks," "gardens," or "farms," prepared somewhat after the following manner, a plot from 25 to 30 feet square being sufficient for about 10,000 snails: A piece of moist calcareous soil is selected, a hillside being preferable because well drained, and calcareous ground chosen because the snails need plenty of lime in shell building. Around this plot a substantial wire fence a foot or two high is built as follows: A trench about a foot deep is dug around the edge of the proposed inclosure and at the corners substantial posts are planted and other intermediate posts are placed as necessity demands. These are now connected by a solid base of boards or by a cement wall built in the trench. This base extending below the surface of the surrounding ground is to prevent the snails escaping below the fence. The base, if of wood, should also extend a few inches above the ground, in order that wire netting may be tacked to it, as described later. If cement is used, the wall should extend to the level of the surrounding ground, and on this a wooden stringer should be placed, to which the wire may be fastened. Next, the posts at the top are connected by wooden stringers heavy enough to give rigidity to the whole structure. To this framework wire netting may now be fastened, using a mesh small enough to prevent the snails crawling through, yet so large that they can not climb over. The trench may then be filled up and leveled off, so as to conform to the rest of the inclosure, the surface of which is then strewn with from 2 to 4 inches of moss or chaff, into which the snails can burrow during unfavorable weather. Sometimes bushes are planted in the inclosure or piles of brush are so arranged as to afford dry and airy shelter during light showers, or shade when the sun is too fervid. It is also advisable to build small roof-like shelters about 6 by 3 feet, under which the mollusks can congregate in order to escape either heat or cold. The pens should be traversed by walks,

so that all parts are readily accessible for the scattering of food or for cleaning. The latter is essential, as during damp weather the moss and bits of food become covered with slime and excrement, or putrify, and are sources of infection, which causes the loss of many of the snails through disease. Really, the best method is to have the snail garden divided into at least two sections, to be used alternately, one section to be thoroughly cleaned and aired while the other is in use. Overcrowding should be avoided, and during hot weather the moss should be sprinkled several times a day in order to insure the right degree of moisture, which is essential to the snail's good health.

The crowded condition of European countries is responsible for the above-described intensive system of snail culture, and it is equally applicable to the more densely populated sections of the United States, but in the Southern and Western States of our Union overcrowding fortunately does not exist as yet, and farms are usually of more ample proportions than those of the recognized snail-producing countries. In view of this fact, snail growing may be a very simple matter in most parts of the United States, for all that is required is a bushy hillside, or, preferably, a limestone bluff near water and partially covered with vegetation, and a few snails with which to stock the preserve. They will require no further attention, as they do not wander far and are perfectly capable of obtaining both food and shelter from the wild plants which cover their domain. There they will multiply, and every farmer might not only have his own supply to replace (at least in part) the widely used oyster, but might also supply his less fortunate city neighbor, with profit to both.

In Europe the peasants go out into the woods, fields, and vineyards as soon as the snails appear in the spring and collect them for the snail farmers. For this work they receive from 40 to 80 cents per thousand snails, and, as one person can gather only 1,000, or with good fortune, 1,500 per day, it can be readily seen that the work can scarcely be classed as very profitable.

As the snails are gathered they are taken to the snail farmers, who buy according to the prevailing price in Paris.

During this handling the active, well-nourished, and consequently tender and juicy mollusks are easily damaged and may die of their bruises or from confinement, so the careful snail grower avoids purchasing those with bruised, battered, or cracked shells. Even after the snails have been placed upon the moss in the inclosures, danger is not passed, for they soon congregate next the fence, where they form piles so high that the topmost ones may crawl over and escape. Even if the fence is too high for this, the massing is very injurious to the snails at the bottom, for they are either starved, smothered, or die from becoming overheated or fouled with excrement and slime. Therefore they must be redistributed over the moss every little while, and this again is a source of loss, for in the process some are crushed, or killed outright, while other shells are broken, thus retarding growth while repairs are made, and, if the injury is extensive, unfavorable weather, disease, or parasites may cause death. Sudden changes of temperature are also very disastrous to these soft-bodied creatures, and many are overtaken in autumn by frost before they can bury themselves, so whenever sudden cold snaps occur moss or blankets should be spread over the snails as a protection when practicable.

FOOD.

Many kinds of food have been tried on the snail farms, but the usual diet consists of cabbage, lettuce, endive, chopped kohlrabi, dandelion leaves, or potatoes. In some snaileries bran mash is given, and fruit, when very cheap, can be fed to advantage, as it is greatly relished by all snails. Sometimes a few aromatic herbs are planted in the inclosure or scattered with the other food, and it is claimed that they greatly improve the flavor of the mollusks. As snails feed mostly at night, it is advisable to distribute their rations well over the snailery just after dusk, at which time the inmates emerge in greatest numbers. Their sense of smell being very acute, the snails soon find their food and attack it by means of the tongue, or radula, which is ribbon-shaped and beset with rows of hundreds of sharp teeth of microscopic size. Care must be taken that the snails do not over-

eat, for if they are allowed too much of some favorite food they will gormandize to such an extent that fermentation sets in and the resultant gases distend or rupture the tender gut and death ensues.

HIBERNATION.

After feeding all summer the snails become very fat and of a semitransparent greenish-white color, much like the cabbage on which they have fed. But with the approach of autumn they grow listless, quit feeding, and, in the free state, burrow 4 or 5 inches into the soil, where they seal themselves up by forming a calcareous epiphragm across the mouth of the shell. In the gardens, however, the snails are prevented from going into the ground by its hardness, so all they can do is to burrow down into the moss, from which they are easily raked out when wanted. Often they are taken out early in the season and stored on trays in a cool warehouse until wanted for market, to which they are shipped while still in the dormant state; bringing from $1.50 to $3.50 or more per thousand, according to their abundance. In this condition they can be kept for months, without deterioration; in fact, snails have been known to live for 3 or 4 years without food. Some, however, possibly on account of improper nourishment or other weakness, never form more than a thin, fragile film across the aperture of the shell, and so must be used comparatively soon, as they are of a perishable nature. These "glass snails," as they are called, together with the "runners," which never form an epiphragm, bring only about $2 per thousand, on account of their limited keeping qualities.

MARKETING.

As is well known, Paris is the greatest of all snail markets, but it is really surprising to learn that more than 200 millions of snails are disposed of during a season, which is of the same duration as our own oyster season—September to April. Another authority says that 50 tons of snails are consumed daily in Paris alone when trade is at its best.

Commercially, only two kinds of snails are recognized in the French market, the "large white Bourgogne" and the "small gray." The marketing season is also divided into

two parts, the first from April 15 until June, during which time the snails are gathered in field and vineyard after rain or early in the morning. These snails are, of course, in the active stage and perishable; therefore they must be disposed of rapidly, and do not bring such high prices as do those sold in the fall. Those which go to the great Central Market (Halles Centrales) are packed in well-ventilated cases, sacks, or baskets, each holding from 500 to 2,000 snails. A thriving business is also done at this season by push-cart peddlers, and, owing to the enormous numbers which are brought in during this time, prices are very low, "large whites" bringing only $1.50 to $2 per thousand, while the same quantity of "small grays" may sometimes be had for 40 or 50 cents.

The second season lasts from September to May, and is divided into two parts, the first of which embraces September and half of October. Most of the "glass" snails appear during this time, for they were gathered in the spring and were kept in pens, but without much care, so that through weakness, neglect, or unnatural conditions the epiphragm did not fully develop.

Of course, they must be used within a short time, but owing to the great demand at this season of the year they bring a good price. Most of them are sold by private contract to grocers, restaurants, wine merchants, etc., and bring from $2.50 to $3 per thousand for "large whites" or about 75 cents or $1 per thousand for "small grays." For the rest or last half of the second season (October 15 to May), the trade is supplied from the hibernating specimens which have been reared on the snail farms. Prices are now a little lower for "large whites," which bring only from $1.75 to $2 per thousand; but the price of "small grays" remains about $1 per thousand.

PREPARATION FOR THE TABLE.

In the United States the popular idea seems to be that all French people eat snails quite often, but such is far from being the case, for the French regard the snail in much the same light as we Americans do the oyster, and, in fact, it is just as nutritious, containing, as it does, about 17 per cent nitrogenous matter. It is not a national dish, however,

but a national delicacy—one to be partaken of perhaps as an entrée at 30 or 40 cents the plate when one goes to dine at some smart *café*—one to be washed down with wine while the orchestra plays softly. A luxury, a "tidbit," if you wish, but scarcely a staple, and never to be mentioned in the same breath as beefsteak and onions.

At one of the best Parisian restaurants where snails are made a specialty the daily consumption often totals 5,000 of the best "large whites," and at numbers of the less select places as many as 10,000 or 12,000 of the cheaper grades are eaten during the 24 hours. However, there is as great a range in price as in the flavor of the snails, so if 30 cents per plate seems a trifle extravagant, one may go to a push-cart on the street and buy them raw for 6 or 7 cents a dozen, and they may be prepared at home in any one of the many appetizing ways so much in vogue with the French chefs.

In Burgundy most of the snails are cooked before being sent to market, so when the demand for the mollusks begins in the autumn the grower goes to his warehouse and the trays of dormant snails are taken down. Women next examine each animal, rejecting the dead ones and removing the epiphragms from the living. Next the shells are brushed to remove any dirt and then placed in flowing water, where they are stirred around by a man with a spade until thoroughly clean.

During this time a large caldron of salt water has been prepared, and in this about 10,000 snails are boiled at a time. The meat is now removed, reduced to a paste, seasoned with finely chopped parsley, chervil, and shallots, and placed between two thin slices of unsalted butter. Meanwhile the shells have been cleaned and dried, and with this mixture they are now stuffed, and the "Burgundy snails" are ready to be shipped off to the private consumer in wooden boxes and baskets of 50, 100, and 200, or to the shops and restaurants in lots of from 500 to a couple of thousand or more.

Another favorite receipt, very similar to the last, is as follows: First the snails are boiled in the shell for 5 minutes, after which they are extracted and thoroughly cleaned. Then they are boiled for 2 hours or more until thoroughly tender. They may now be left in this state, or, if desired, may

be thoroughly minced. Make a paste of butter, a considerable quantity of good olive oil, chopped parsley to taste, and a small quantity of finely minced eschalot. Thoroughly cleanse the shells by boiling and scrubbing until nearly white, and then stuff these with the prepared snail meat, closing the aperture with a plug of the butter paste above referred to. In this condition they can be kept for some time, if refrigerated, and all that remains to be done before serving is to heat them for about 5 minutes over a hot fire, which literally broils the meat in the butter paste. The shells are served upon a silver platter and the edible part picked out with a two-pronged fork. Thus served, snails make a delectable entrée, especially if a light wine accompanies the course.

Another favorite dish is *escargots (snails) á la Bordelaise;* simply a combination of the cooked snail meats, garlic, butter, and red wine. For those who find the above too rich, a body of toasted crackers or bread crumbs can be added, and the whole baked together, using just enough butter and wine to bring about the right consistency.

During recent years the great demand for snails has led to a number of imitations, and many are the deceptions practiced. For instance, the snail grower picks up and cleans all the old shells which have accumulated during the summer. These he sends to Paris, where they bring about 25 cents per thousand at cheap restaurants, etc., where they are stuffed with a mixture of a little snail flesh, lots of liver, some butter, and plenty of herbs to disguise the mixture. The result is sold for "genuine Burgundy snails."

PRESENT STATUS OF THE INDUSTRY.

Even though the market for snails is still so great in Europe, snail gathering and snail farming do not seem to be at all profitable over there, and in many localities where they were formerly abundant the mollusks can no longer be obtained, even many eminent French authorities admitting that "snails as an edible commodity trade a good deal on their ancient fame." Only a short time ago one of the most widely read agricultural papers of France was asked if the rearing of edible snails was economically possible, and the answer was, "We respond without hesitation, no."

POSSIBILITIES OF THE INDUSTRY IN THE UNITED STATES.

In the United States snails are often stocked by the fish markets of our larger cities, where they have a limited sale among the foreigners, but comparatively few native-born Americans have ever tasted them, know of their preparation as food, or even consider them as a fit article of diet. Those sold in our markets are practically all imported from France, but such should not be the case, as they are an excellent and tasty article of diet, are very easy of culture, and should, therefore, be grown over large sections of our country where they are now unknown.

Almost everyone who has ever eaten well-prepared snails admits their gastronomic worth, both from the point of nutritive value and that of flavor, and there are many States where they could be grown and kept fresh until used where they would prove a very welcome addition to the somewhat limited menu of the locality. In the Mississippi Valley, for instance, where conditions for their cultivation are almost ideal, they could be grown at practically no cost (either in money, time, or labor) and might be used to a great extent in place of oysters, which they greatly resemble in flavor when properly prepared. Such a practice would be greatly advantageous, for the snail is really preferable as an article of human consumption, as it is cleaner, feeding daintily, as it does, only on the cleanest of vegetable tissues, while oysters, not being able to move about in search of food, must take what comes to them in the water, are sometimes fattened in water impregnated with bacteria-laden sewage, and thus act as carriers of typhoid and other diseases.

For economic reasons a thorough trial should be given these mollusks, since, as stated above, there are many sections where, if once introduced, they could be left to their own devices and gathered as needed for home consumption or for the market. Not even a fence is needed for their confinement, as they do not stray far from the point of liberation if conditions there are favorable to their development. Thus not only a new food might be added to the American table, but the income derived from the sale of snails might reach a considerable figure in the aggregate.

CONCLUSION.

Conditions on this side the Atlantic are so different from those encountered in Europe that where snail culture there may not be markedly profitable it might be made so here. There people depend for their livelihood on the growing of snails, which must be watched, tended, and reared on a small patch of ground; their food must be grown and supplied them regularly, and everything done with much labor, while here in the United States, where we have much unoccupied land, the snails may be turned loose on a limestone bluff, which is good for nothing else, and the profits reaped. If the snails multiply sparingly, the profits would consist only in the added variety to the grower's menu, but if production were on a larger scale, the surplus could be sold when a market had been created by a little judicious publicity, and the profits taken in hard cash. But be the profits great or small at first, a really worthy article of diet would have been introduced, and an industry created which might reach large proportions if the American people could only be educated to see the true worth of the edible snail.

APPENDIX.

AGRICULTURAL COLLEGES IN THE UNITED STATES.[1]

College instruction in agriculture is given in the colleges and universities receiving the benefits of the acts of Congress of July 2, 1862, August 30, 1890, and March 4, 1907, which are now in operation in all the States and Territories except Alaska. The total number of these institutions is 68, of which 65 maintain courses of instruction in agriculture. In 23 States the agricultural colleges are departments of the State universities. In 16 States and Territories separate institutions having courses in agriculture are maintained for the colored race. All of the agricultural colleges for white persons and several of those for negroes offer four-year courses in agriculture and its related sciences leading to bachelors' degrees, and many provide for graduate study. About 60 of these institutions also provide special, short, or correspondence courses in the different branches of agriculture, including agronomy, horticulture, animal husbandry, poultry raising, cheese making, dairying, sugar making, rural engineering, farm mechanics, and other technical subjects. Officers of the agricultural colleges engage quite largely in conducting farmers' institutes and various other forms of college extension. The agricultural experiment stations, with very few exceptions, are departments of the agricultural colleges. The total number of persons engaged in the work of education and research in the land-grant colleges and the experiment stations in 1914 was 7,537, the number of students (white) in interior courses in the colleges of agriculture and mechanic arts, 55,129; the total number of students in the whole institutions, 105,803;[2] the number of students (white) in the four-year college courses in agriculture, 14,246; the total number of students in the institutions for negroes, 9,251, of whom 2,200 were enrolled in agricultural courses. With a few exceptions, each of these colleges offers free tuition to residents of the State in which it is located. In the excepted cases scholarships are open to promising and energetic students, and in all opportunities are found for some to earn part of their expenses by their own labor. The expenses are from $125 to $300 for the school year.

Agricultural colleges in the United States.

State or Territory.	Name of institution.	Location.	President.
Alabama	Alabama Polytechnic Institute	Auburn	C. C. Thach.
	Agricultural School of the Tuskegee *Normal and Industrial Institute.*	Tuskegee Institute	B. T. Washington.
	Agricultural and Mechanical College for Negroes.	Normal	W. S. Buchanan.
Arizona	College of Agriculture of the University of Arizona.	Tucson	R. H. Forbes.[3]
Arkansas	College of Agriculture of the University of Arkansas.	Fayetteville	Martin Nelson.[3]
	Branch Normal College	Pine Bluff	F. T. Venegar.
California	College of Agriculture of the University of California.	Berkeley	T. F. Hunt.[3]
Colorado	The State Agricultural College of Colorado.	Fort Collins	C. A. Lory.
Connecticut	Connecticut Agricultural College	Storrs	C. L. Beach.
Delaware	Delaware College	Newark	S. C. Mitchell.
	State College for Colored Students	Dover	W. C. Jason.
Florida	College of Agriculture of the University of Florida.	Gainesville	J. J. Vernon.[3]
	Florida Agricultural and Mechanical College for Negroes.	Tallahassee	N. B. Young.
Georgia	Georgia State College of Agriculture	Athens	A. M. Soule.
	Georgia State Industrial College	Savannah	R. R. Wright.
Hawaii	College of Hawaii	Honolulu	A. L. Dean.
Idaho	College of Agriculture of the University of Idaho.	Moscow	E. J. Iddings.[4]

[1] Including only institutions established under the land-grant act of July 2, 1862.
[2] Not including students in correspondence courses and extension schools.
[3] Dean.
[4] Acting dean.

Agricultural colleges in the United States—Continued.

State or Territory.	Name of institution.	Location.	President.
Illinois	College of Agriculture of the University of Illinois.	Urbana	E. Davenport.[1]
Indiana	School of Agriculture of Purdue University.	La Fayette	J. H. Skinner.[1]
Iowa	Iowa State College of Agriculture and Mechanic Arts.	Ames	R. A. Pearson.
Kansas	Kansas State Agricultural College	Manhattan	H. J. Waters.
Kentucky	The College of Agriculture of the State University.	Lexington	J. H. Kastle.[1]
	The Kentucky Normal and Industrial Institute for Colored Persons.	Frankfort	G. P. Russell.
Louisiana	Louisiana State University and Agricultural and Mechanical College.	Baton Rouge	T. D. Boyd.
	Southern University and Agricultural and Mechanical College of the State of Louisiana.	Scotland Heights, Baton Rouge.	J. S. Clark.
Maine	College of Agriculture of the University of Maine.	Orono	L. S. Merrill.[1]
Maryland	Maryland Agricultural College	College Park	H. J. Patterson.
	Princess Anne Academy, Eastern Branch of the Maryland Agricultural College.	Princess Anne	T. H. Kiah.
Massachusetts	Massachusetts Agricultural College	Amherst	K. L. Butterfield.
	Massachusetts Institute of Technology[2]	Boston	R. C. Maclaurin.
Michigan	Michigan Agricultural College	East Lansing	J. L. Snyder.
Minnesota	College of Agriculture of the University of Minnesota.	University Farm, St. Paul.	A. F. Woods.[1]
Mississippi	Mississippi Agricultural and Mechanical College.	Agricultural College.	G. R. Hightower.
	Alcorn Agricultural and Mechanical College.	Alcorn	J. A. Martin.
Missouri	College of Agriculture of the University of Missouri.	Columbia	F. B. Mumford.[1]
	School of Mines and Metallurgy of the University of Missouri.[2]	Rolla	
	Lincoln Institute	Jefferson City	B. F. Allen.
Montana	Montana State College of Agriculture and Mechanic Arts.	Bozeman	Jas. M. Hamilton.
Nebraska	College of Agriculture of the University of Nebraska.	Lincoln	E. A. Burnett.[1]
Nevada	College of Agriculture of the University of Nevada.	Reno	C. S. Knight.[1]
New Hampshire	New Hampshire College of Agriculture and the Mechanic Arts.	Durham	E. T. Fairchild.
New Jersey	Rutgers College (the New Jersey State College for the Benefit of Agriculture and the Mechanic Arts).	New Brunswick	W. H. S. Demarest.
New Mexico	New Mexico College of Agriculture and Mechanic Arts.	State College	George E. Ladd.
New York	New York State College of Agriculture	Ithaca	B. T. Galloway.[1]
North Carolina	The North Carolina College of Agriculture and Mechanic Arts.	West Raleigh	D. H. Hill.
	The Agricultural and Mechanical College for the Colored Race.	Greensboro	J. B. Dudley.
North Dakota	North Dakota Agricultural College	Agricultural College.	J. H. Worst.
Ohio	College of Agriculture of Ohio State University.	Columbus	H. C. Price.[1]
Oklahoma	Oklahoma Agricultural and Mechanical College.	Stillwater	L. L. Lewis.[3]
	Agricultural and Normal University	Langston	I. E. Page.
Oregon	Oregon State Agricultural College	Corvallis	W. J. Kerr.
Pennsylvania	The School of Agriculture of the Pennsylvania State College.	State College	R. L. Watts.[1]
Porto Rico	College of Agriculture and Mechanic Arts of the University of Porto Rico.	Mayaguez	R. S. Garwood.[1]
Rhode Island	Rhode Island State College	Kingston	Howard Edwards.
South Carolina	The Clemson Agricultural College of South Carolina.	Clemson College	W. M. Riggs.
	The Colored Normal, Industrial, Agricultural, and Mechanical College of South Carolina.	Orangeburg	R. S. Wilkinson.
South Dakota	South Dakota State College of Agriculture and Mechanic Arts.	Brookings	E. C. Perisho.
Tennessee	College of Agriculture, University of Tennessee.	Knoxville	Brown Ayres.
Texas	Agricultural and Mechanical College of Texas.	College Station	W. B. Bizzell.
	Prairie View State Normal and Industrial College.	Prairie View	E. L. Blackshear.

[1] Dean. [2] Does not maintain courses in agriculture. [3] Acting president.

Agricultural colleges in the United States—Continued.

State or Territory.	Name of institution.	Location.	President.
Utah	The Agricultural College of Utah	Logan	J. A. Widtsoe.
Vermont	College of Agriculture of the University of Vermont.	Burlington	J. L. Hills.[1]
Virginia	The Virginia Agricultural and Mechanical College and Polytechnic Institute.	Blacksburg	J. D. Eggleston.
	The Hampton Normal and Agricultural Institute.	Hampton	H. B. Frissell.
Washington	State College of Washington	Pullman	E. A. Bryan.
West Virginia	College of Agriculture of West Virginia University.	Morgantown	E. D. Sanderson.[1]
	The West Virginia Colored Institute	Institute	Byrd Prillerman.
Wisconsin	College of Agriculture of the University of Wisconsin.	Madison	H. L. Russell.[1]
Wyoming	College of Agriculture, University of Wyoming.	Laramie	H. G. Knight.[1]

[1] Dean.

AGRICULTURAL EXPERIMENT STATIONS OF THE UNITED STATES, THEIR LOCATIONS AND DIRECTORS.

Alabama (College), Auburn: J. F. Duggar.
Alabama (Canebrake), Uniontown: L. H. Moore.
Alabama (Tuskegee), Tuskegee Institute: G. W. Carver.
Alaska, Sitka (Rampart, Kodiak, and Fairbanks): C. C. Georgeson.[1]
Arizona, Tucson: R. H. Forbes.
Arkansas, Fayetteville: Martin Nelson.
California, Berkeley: T. F. Hunt.
Colorado, Fort Collins: C. P. Gillette.
Connecticut (State), New Haven; Connecticut (Storrs), Storrs: E. H. Jenkins.
Delaware, Newark: Harry Hayward.
Florida, Gainesville: P. H. Rolfs.
Georgia, Experiment: R. J. H. DeLoach.
Guam:[2] A. C. Hartenbower.[3]
Hawaii (Federal), Honolulu: J. M. Westgate.[3]
Hawaii (Sugar Planters'), Honolulu: H. P. Agee.
Idaho, Moscow: J. S. Jones.[4]
Illinois, Urbana: E. Davenport.
Indiana, La Fayette: Arthur Goss.
Iowa, Ames: C. F. Curtiss.
Kansas, Manhattan: W. M. Jardine.
Kentucky, Lexington: J. H. Kastle.
Louisiana (Sugar), New Orleans; Louisiana (State), Baton Rouge; Louisiana (North), Calhoun; Louisiana (Rice), Crowley: W. R. Dodson.
Maine, Orono: C. D. Woods.
Maryland, College Park: H. J. Patterson.
Massachusetts, Amherst: W. P. Brooks.
Michigan, East Lansing: R. S. Shaw.
Minnesota, University Farm, St. Paul: A. F. Woods.
Mississippi, Agricultural College: E. R. Lloyd.
Missouri (College), Columbia: F. B. Mumford.
Missouri (Fruit), Mountain Grove: Paul Evans.
Montana, Bozeman: F. B. Linfield.
Nebraska, Lincoln: E. A. Burnett.
Nevada, Reno: S. B. Doten.
New Hampshire, Durham: J. C. Kendall.
New Jersey (State), New Brunswick; New Jersey (College), New Brunswick: J. G. Lipman.
New Mexico, State College: Fabian Garcia.
New York (State), Geneva: W. H. Jordan.
New York (Cornell), Ithaca: B. T. Galloway.
North Carolina, Raleigh and West Raleigh: B. W. Kilgore.
North Dakota, Agricultural College: T. P. Cooper.
Ohio, Wooster: C. E. Thorne.
Oklahoma, Stillwater: W. L. Carlyle.
Oregon, Corvallis: A. B. Cordley.
Pennsylvania, State College: R. L. Watts.
Pennsylvania (Institute of Animal Nutrition), State College: H. P. Armsby.
Porto Rico (Federal), Mayaguez: D. W. May.[1]
Porto Rico (Insular), Rio Piedras: W. V. Tower.
Rhode Island, Kingston: B. L. Hartwell.
South Carolina, Clemson College: J. N. Harper.
South Dakota, Brookings: J. W. Wilson.
Tennessee, Knoxville: H. A. Morgan.
Texas, College Station: B. Youngblood.
Utah, Logan: E. D. Ball.
Vermont, Burlington: J. L. Hills.
Virginia (College), Blacksburg: W. J. Schoene.[4]
Virginia (Truck), Norfolk: T. C. Johnson.
Washington, Pullman: I. D. Cardiff.
West Virginia, Morgantown: E. D. Sanderson.
Wisconsin, Madison: H. L. Russell.
Wyoming, Laramie: H. G. Knight.

[1] Special agent in charge.
[2] Address: Island of Guam, via San Francisco.
[3] Agronomist in charge.
[4] Acting director.

STATE OFFICIALS IN CHARGE OF AGRICULTURE.

Alabama: Commissioner of Agriculture, Montgomery.
Alaska: Director of Experiment Stations, Sitka.
Arizona: Director of Experiment Station, Tucson.
Arkansas: Commissioner of Agriculture, Little Rock.
California: Secretary of State Board of Agriculture, Sacramento.
Colorado: Secretary of State Boord of Agriculture, Fort Collins.
Connecticut: Secretary of State Board of Agriculture, Hartford.
Delaware: Secretary of State Board of Agriculture, Dover.
Florida: Commissioner of Agriculture, Tallahassee.
Georgia: Commissioner of Agriculture, Atlanta.
Guam: Director of Experiment Station, Guam.
Hawaii: Secretary of Territorial Board of Agriculture, Honolulu.
Idaho: Commissioner of Immigration, Labor, and Statistics, Boise.
Illinois: Secretary of State Board of Agriculture, Springfield.
Indiana: Secretary of State Board of Agriculture, Indianapolis.
Iowa: Secretary of State Board of Agriculture, Des Moines.
Kansas: Secretary of State Board of Agriculture, Topeka.
Kentucky: Commissioner of Agriculture, Frankfort.
Louisiana: Commissioner of Agriculture, Baton Rouge.
Maine: Commissioner of Agriculture, Augusta.
Maryland: Director of Experiment Station, College Park.
Massachusetts: Secretary of State Board of Agriculture, Boston.
Michigan: Secretary of State Board of Agriculture, East Lansing.
Minnesota: Secretary of State Agricultural Society, St. Paul.
Mississippi: Commissioner of Agriculture, Jackson.
Missouri: Secretary of State Board of Agriculture, Columbia.
Montana: Commissioner of Agriculture, Helena.
Nebraska: Secretary of State Board of Agriculture, Lincoln.
Nevada: Secretary of State Board of Agriculture, Carson City.
New Hampshire: Secretary of State Board of Agriculture, Concord.
New Jersey: Secretary of State Board of Agriculture, Trenton.
New Mexico: Director of Experiment Station, Agricultural College.
New York: Commissioner of Agriculture, Albany.
North Carolina: Commissioner of Agriculture, Raleigh.
North Dakota: Commissioner of Agriculture, Bismarck.
Ohio: Secretary of State Board of Agriculture, Columbus.
Oklahoma: President of State Board of Agriculture, Oklahoma.
Oregon: Secretary of State Board of Agriculture, Salem.
Pennsylvania: Secretary of Agriculture, Harrisburg.
Philippine Islands: Director of Agriculture, Manila.
Porto Rico: Director of Experiment Station, Mayaguez.
Rhode Island: Secretary of State Board of Agriculture, Providence.
South Carolina: Commissioner of Agriculture, Columbia.
South Dakota: Secretary of State Board of Agriculture, Huron.
Tennessee: Commissioner of Agriculture, Nashville.
Texas: Commissioner of Agriculture, Austin.
Utah: Director of Experiment Station, Logan.
Vermont: Commissioner of Agriculture, St. Albans.
Virginia: Commissioner of Agriculture, Richmond.
Washington: Commissioner of Agriculture, Olympia.
West Virginia: Secretary of State Board of Agriculture, Charleston.
Wisconsin: Secretary of State Board of Agriculture, Madison.
Wyoming: Director of Experiment Station, Laramie.

STATE OFFICERS IN CHARGE OF COOPERATIVE AGRICULTURAL EXTENSION WORK.

Alabama: J. F. Duggar, Alabama Polytechnic Institute, Auburn.
Arizona: S. F. Morse, College of Agriculture, University of Arizona, Tucson.
Arkansas: W. C. Lassetter, College of Agriculture, University of Arkansas, Fayetteville.
California: W. T. Clarke, College of Agriculture, University of California, Berkeley.
Colorado: C. A. Lory, State Agricultural College of Colorado, Fort Collins.
Connecticut: H. J. Baker, Connecticut Agricultural College, Storrs.
Delaware: H. Hayward, Delaware College, Newark.
Florida: P. H. Rolfs, College of Agriculture, University of Florida, Gainesville.
Georgia: A. M. Soule, Georgia State College of Agriculture, Athens.
Idaho: O. D. Center, College of Agriculture, University of Idaho, Boise.
Illinois: W. F. Handschin, College of Agriculture, University of Illinois, Urbana.
Indiana: G. I. Christie, Purdue University, La Fayette.
Iowa: R. K. Bliss, Iowa State College, Ames.
Kansas: J. H. Miller, Kansas State Agricultural College, Manhattan.
Kentucky: Fred Mutchler, College of Agriculture, State University, Lexington.
Louisiana: W. R. Dodson, Louisiana State University, Baton Rouge.

Maine: L. S. Merrill, College of Agriculture, University of Maine, Orono.

Maryland: T. B. Symons, Maryland Agricultural College, College Park.

Massachusetts: W. D. Hurd, Massachusetts Agricultural College, Amherst.

Michigan: R. J. Baldwin, Michigan Agricultural College, East Lansing.

Minnesota: A. D. Wilson, College of Agriculture, University of Minnesota, University Farm, St. Paul.

Mississippi: E. R. Lloyd, Mississippi Agricultural and Mechanical College, Agricultural College.

Missouri: A. J. Meyer, College of Agriculture, University of Missouri, Columbia.

Montana: F. S. Cooley, Montana State College of Agriculture and Mechanic Arts, Bozeman.

Nebraska: C. W. Pugsley, College of Agriculture, University of Nebraska, Lincoln.

Nevada: C. S. Knight, College of Agriculture, University of Nevada, Reno.

New Hampshire: J. C. Kendall, New Hampshire College of Agriculture and Mechanic Arts, Durham.

New Jersey: Alva Agee, Rutgers College, New Brunswick.

New Mexico: A. C. Cooley, New Mexico College of Agriculture and Mechanic Arts, State College.

New York: B. T. Galloway, New York State College of Agriculture, Ithaca.

North Carolina: B. W. Kilgore, North Carolina College of Agriculture and Mechanic Arts, West Raleigh.

North Dakota: T. P. Cooper, North Dakota Agricultural College, Agricultural College.

Ohio: H. C. Price, College of Agriculture, Ohio State University, Columbus

Oklahoma: W. D. Bentley, Oklahoma Agricultural and Mechanical College, Stillwater.

Oregon: R. D. Hetzel, Oregon State Agricultural College, Corvallis.

Pennsylvania: M. S. McDowell, Pennsylvania State College, State College.

Rhode Island: A. E. Stene, Rhode Island State College, Kingston.

South Carolina: W. W. Long, Clemson Agricultural College of South Carolina, Clemson College.

South Dakota: E. C. Perisho, South Dakota State College, Brookings.

Tennessee: C. A. Keffer, College of Agriculture, University of Tennessee, Knoxville.

Texas: Clarence Ousley, Agricultural and Mechanical College of Texas, College Station.

Utah: E. G. Peterson, Agricultural College of Utah, Logan.

Vermont: Thos. Bradlee, College of Agriculture, University of Vermont, Burlington.

Virginia: J. D. Eggleston, Virginia Polytechnic Institute, Blacksburg.

Washington: J. A. Tormey, State College of Washington, Pullman.

West Virginia: C. R. Titlow, College of Agriculture, West Virginia University, Morgantown.

Wisconsin: K. L. Hatch, College of Agriculture, University of Wisconsin, Madison.

Wyoming: A. E. Bowman, College of Agriculture, University of Wyoming, Laramie.

STATISTICS OF THE PRINCIPAL CROPS.

[Figures furnished by the Bureau of Crop Estimates, Department of Agriculture, except where otherwise stated. All prices on gold basis.]

CORN.

TABLE 1.—*Corn: Area and production of countries undermentioned, 1912–1914.*

Country.	Area.			Production.		
	1912	1913	1914	1912	1913	1914
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	107,083,000	105,820,000	103,435,000	3,124,746,000	2,446,988,000	2,672,804,000
Canada:						
Ontario	279,000	260,000	239,000	16,466,000	16,182,000	13,410,000
Quebec	19,000	18,000	17,000	476,000	586,000	514,000
Other	(1)	(1)	(1)	8,000	5,000	.....
Total Canada	298,000	278,000	256,000	16,950,000	16,773,000	13,924,000
Mexico	(2) 13,375,000	(3)	(3)	190,000,000	190,000,000	190,000,000
Total	.....	.....	.....	3,331,696,000	2,653,761,000	2,876,728,000
SOUTH AMERICA.						
Argentina	8,456,000	9,464,000	10,260,000	295,849,000	196,642,000	204,502,000
Chile	56,000	65,000	(3)	1,527,000	1,647,000	(3)
Uruguay	591,000	629,000	(3)	7,963,000	5,343,000	(3)
Total	9,103,000	10,158,000	.....	305,339,000	203,632,000	.....
EUROPE.						
Austria-Hungary:						
Austria	752,000	706,000	(3)	15,058,000	13,286,000	(3)
Hungary proper	6,022,000	6,129,000	(3)	176,694,000	182,069,000	(3)
Croatia-Slavonia	1,065,000	1,083,000	(3)	24,066,000	28,955,000	(3)
Bosnia-Herzegovina	549,000	805,000	(3)	8,555,000	7,559,000	(3)
Total Austria-Hungary	8,388,000	8,723,000	(3)	224,373,000	231,869,000	(3)
Bulgaria	1,579,000	1,404,000	(3)	28,475,000	32,000,000	31,000,000
France	1,177,000	1,020,000	1,141,000	23,733,000	21,455,000	22,000,000
Italy	3,938,000	3,888,000	3,680,000	98,668,000	108,388,000	105,006,000
Portugal	(3)	(3)	(3)	15,000,000	15,000,000	15,000,000
Roumania	5,104,000	5,305,000	4,942,000	103,921,000	114,662,000	110,230,000
Russia:						
Russia proper	3,393,000	.....	.....	62,904,000	.....	.....
Northern Caucasia	662,000	.....	.....	16,704,000	.....	.....
Total Russia	4,055,000	4,210,000	3,893,000	79,608,000	72,703,000	80,608,000
Servia	1,446,000	1,445,000	(3)	22,833,000	23,621,000	20,000,000
Spain	1,149,000	1,105,000	1,137,000	25,069,000	25,140,000	30,325,000
Total	.....	.....	.....	621,680,000	644,928,000	.....
ASIA.						
British India	5,591,000	(3)	(3)	(3)	(3)	(3)
Japan	136,000	133,000	141,000	3,802,000	3,559,000	3,758,000
Philippine Islands	840,000	988,000	(3)	7,810,000	10,224,000	(3)
Total	.....	.....	.....	.....	.....	.....
AFRICA.						
Algeria	31,000	24,000	(3)	374,000	394,000	(3)
Egypt	1,903,000	1,923,000	.....	60,857,000	57,044,000	66,744,000
Union of South Africa	(3)	(3)	(3)	(4) 30,830,000	(4) 30,830,000	(4) 30,830,000
Total	.....	.....	.....	92,061,000	88,268,000	97,574,000

[1] Less than 500 acres.
[2] Area refers to 1910.
[3] No official statistics.
[4] Census figures of 1911.

CORN—Continued.

TABLE 1.—*Corn: Area and production of countries undermentioned, 1912–1914*—Contd.

Country.	Area.			Production.		
	1912	1913	1914	1912	1913	1914
AUSTRALASIA.						
Australia:	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
Queensland	154,000	118,000	157,000	3,752,000	2,604,000	4,039,000
New South Wales [1]	168,000	177,000	162,000	4,649,000	5,273,000	4,496,000
Victoria	18,000	20,000	18,000	818,000	738,000	826,000
Western Australia	(3)	(3)	(3)	1,000		(2)
South Australia [4]	(3)	(3)	(3)	2,000	4,000	(2)
Total Australia	340,000	315,000	337,000	9,222,000	8,619,000	9,461,000
New Zealand	6,000	5,000	6,000	278,000	222,000	312,000
Total Australasia	346,000	320,000	343,000	9,500,000	8,841,000	9,773,000
Grand total				4,371,888,000	3,613,213,000	

[1] Includes Federal Territory.
[2] No official statistics.
[3] Less than 500 acres.
[4] Includes Northern Territory.

TABLE 2.—*Corn: Total production of countries mentioned in Table 1, 1895–1914.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1895	2,834,750,000	1900	2,792,561,000	1905	3,461,181,000	1910	4,031,630,000
1896	2,964,435,000	1901	2,366,883,000	1906	3,963,645,000	1911	3,481,007,000
1897	2,587,206,000	1902	3,187,311,000	1907	3,420,321,000	1912	4,371,888,000
1898	2,682,619,000	1903	3,066,506,000	1908	3,606,931,000	1913	3,613,213,000
1899	2,724,100,000	1904	3,109,252,000	1909	3,563,226,000	1914	

CORN—Continued.

Table 3.—*Corn: Acreage, production, value, exports, etc., in the United States, 1849–1914.*

Note.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, contract [1] December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, including corn meal, fiscal year beginning July 1.	Per cent of crop exported.
	Acres.	*Bush.*	*Bushels.*	*Cents.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*	*P. ct.*
1849..			*592,071,000*							7,632,860	1.3
1859..			*838,793,000*							4,248,991	.5
1866..	34,307,000	25.3	867,946,000	47.4	411,451,000	53	62	64	79	16,026,947	1.8
1867..	32,520,000	23.6	768,320,000	57.0	437,770,000	61	65	61	71	12,493,522	1.6
1868..	*34,887,000*	*26.0*	*906,527,000*	*46.8*	*424,057,000*	38	58	44	*51*	*8,286,665*	.9
1869..	37,103,000	23.6	874,320,000	59.8	522,551,000	56	67	73	85	2,140,487	.2
1869..			*760,945,000*								
1870..	38,647,000	28.3	1,094,255,000	49.4	540,520,000	41	59	46	52	10,673,553	1.0
1871..	34,091,000	29.1	991,898,000	43.4	430,356,000	36	39	38	43	35,727,010	3.6
1872..	35,527,000	30.8	1,092,719,000	35.3	385,736,000	27	28	34	39	40,154,374	3.7
1873..	*39,197,000*	*23.8*	*932,274,000*	*44.2*	*411,961,000*	*40*	*49*	*49*	*59*	*35,985,834*	*3.9*
1874..	41,037,000	20.7	850,148,000	58.4	496,271,000	64	76	53	67	30,025,036	3.5
1875..	44,841,000	29.5	1,321,069,000	36.7	484,675,000	40	47	41	45	50,910,532	3.9
1876..	49,033,000	26.2	1,283,828,000	34.0	436,109,000	40	43	43	56	72,652,611	5.7
1877..	*50,369,000*	*26.7*	*1,342,558,000*	*34.8*	*467,635,000*	*41*	*49*	*35*	*41*	*87,192,110*	*6.5*
1878..	51,585,000	26.9	1,388,219,000	31.7	440,281,000	30	32	33	36	87,884,892	6.3
1879..	*53,085,000*	*29.2*	*1,547,902,000*	*37.5*	*580,486,000*	*39*	*43½*	*32⅞*	*36⅛*	*99,572,329*	*6.4*
1879..	*62,369,000*	*28.1*	*1,754,592,000*								
1880..	62,318,000	27.6	1,717,435,000	39.6	679,714,000	35⅞	42	41½	45	93,648,147	5.5
1881..	64,262,000	18.6	1,194,916,000	63.6	759,482,000	58½	63½	69	76¼	44,340,683	3.7
1882..	*65,660,000*	*24.6*	*1,617,025,000*	*48.5*	*783,867,000*	*49¾*	*61*	*53½*	*56⅞*	*41,655,653*	*2.6*
1883..	68,302,000	22.7	1,551,067,000	42.4	658,051,000	54½	63½	52½	57	46,258,606	3.0
1884..	*69,684,000*	*25.8*	*1,795,528,000*	*35.7*	*640,736,000*	*34¼*	*40¾*	*44¾*	*49*	*52,876,456*	*2.9*
1885..	73,130,000	26.5	1,936,176,000	32.8	635,675,000	36	42½	34½	36⅝	64,829,617	3.3
1886..	75,694,000	22.0	1,665,441,000	36.6	610,311,000	35¼	38	36⅞	39⅝	41,368,584	2.5
1887..	72,393,000	20.1	1,456,161,000	44.4	646,107,000	47	51½	54	60	25,360,869	1.7
1888..	75,673,000	26.3	1,987,790,000	34.1	677,562,000	33½	35¾	33¼	35⅝	70,841,673	3.6
1889..	78,320,000	27.0	2,112,892,000	28.3	597,919,000	29½	35	32⅞	35	103,418,709	4.9
1889..	*72,088,000*	*29.4*	*2,122,328,000*								
1890..	71,971,000	20.7	1,489,970,000	50.6	754,433,000	47¼	53	55	69½	32,041,529	2.2
1891..	76,205,000	27.0	2,060,154,000	40.6	836,439,000	39⅞	59	40¾	[2] 100	76,602,285	3.7
1892..	*70,627,000*	*23.1*	*1,628,464,000*	*39.4*	*642,147,000*	*40*	*42¾*	*39¾*	*44½*	*47,121,894*	*2.9*
1893..	72,036,000	22.5	1,619,496,000	36.5	591,626,000	34¼	36⅛	36⅞	38¼	66,489,529	4.1
1894..	*62,582,000*	*19.4*	*1,212,770,000*	*45.7*	*554,719,000*	*44⅞*	*47½*	*47⅞*	*55½*	*28,585,405*	*2.4*
1895..	82,076,000	26.2	2,151,139,000	25.3	544,986,000	25	26¾	27½	29½	101,100,375	4.7
1896..	81,027,000	28.2	2,283,875,000	21.5	491,007,000	22½	23⅞	23	25½	178,817,417	7.8
1897..	*80,095,000*	*23.8*	*1,902,968,000*	*26.3*	*501,073,000*	*25*	*27½*	*32⅝*	*37*	*212,055,543*	*11.1*
1898..	77,722,000	24.8	1,924,185,000	28.7	552,023,000	33⅛	38	32¼	34⅞	177,255,046	9.2
1899..	82,109,000	25.3	2,078,144,000	30.3	629,210,000	30	31½	36	40⅛	213,123,412	10.3
1899..	*94,914,000*	*28.1*	*2,666,324,000*								
1900..	83,321,000	25.3	2,105,103,000	35.7	751,220,000	35½	40½	42⅜	58½	181,405,473	8.6
1901..	91,350,000	16.7	1,522,520,000	60.5	921,556,000	62½	67½	59¼	64¾	28,028,688	1.8
1902..	*94,044,000*	*26.8*	*2,523,648,000*	40.3	1,017,017,000	43¾	57¼	44	46	76,639,261	3.0
1903..	88,092,000	25.5	2,244,177,000	42.5	952,869,000	41	43¾	47½	50	58,222,061	2.6
1904..	*92,232,000*	*26.8*	*2,467,481,000*	*44.1*	*1,087,461,000*	*43½*	*49*	*48*	*64½*	*90,293,483*	*3.7*
1905..	94,011,000	28.8	2,707,994,000	41.2	1,116,697,000	42	50½	47½	50	119,893,833	4.4
1906..	96,738,000	30.3	2,927,416,000	39.9	1,166,626,000	40	46	49½	56	86,368,228	3.0
1907..	99,931,000	25.9	2,592,320,000	51.6	1,336,901,000	57½	61¼	67¾	*82*	55,063,860	2.1
1908..	101,788,000	26.2	2,668,651,000	60.6	1,616,145,000	56⅞	62½	72¼	76	37,665,040	1.4
1909..	108,771,000	25.5	2,772,376,000								
1909..	*98,383,000*	*25.9*	*2,552,190,000*	*57.9*	1,477,223,000	62½	66	56	63	38,128,498	1.5
1910[3]..	104,035,000	27.7	2,886,260,000	48.0	1,384,817,000	45½	50	52½	55½	65,614,522	2.3
1911..	105,825,000	23.9	2,531,488,000	61.8	1,565,258,000	68	70	76¼	82¼	41,797,291	1.7
1912..	107,083,000	29.2	3,124,746,000	48.7	1,520,454,000	47½	54	55½	60	50,780,143	1.6
1913..	105,820,000	23.1	2,446,988,000	69.1	1,692,092,000	64	73½	67	72½	10,725,819	.4
1914..	103,435,000	25.8	2,672,804,000	64.4	1,722,070,000	62¼	66¾				

[1] No. 2 to 1908. [2] Coincident with "corner." [3] Figures adjusted to census basis.

CORN—Continued.

TABLE 4.—*Corn: Acreage, production, and total farm value, by States, 1913 and 1914.*

State.	Thousands of acres.		Production (thousands of bushels).		Total value, basis Dec. 1 price (thousands of dollars).	
	1914	1913	1914	1913	1914	1913
Maine	16	16	730	608	648	529
New Hampshire	21	22	966	814	792	659
Vermont	45	45	2,115	1,665	1,713	1,349
Massachusetts	48	48	2,256	1,944	1,918	1,652
Rhode Island	11	11	462	402	453	398
Connecticut	61	61	2,806	2,348	2,497	1,996
New York	550	527	22,550	15,020	18,716	12,166
New Jersey	272	275	10,472	10,862	7,959	8,146
Pennsylvania	1,463	1,463	62,178	57,057	45,390	41,081
Delaware	197	197	7,092	6,206	4,397	3,662
Maryland	663	670	24,531	22,110	16,681	14,372
Virginia	1,921	1,980	39,380	51,480	31,898	39,135
West Virginia	732	732	22,692	22,692	18,834	18,154
North Carolina	2,835	2,835	57,550	55,282	49,493	48,648
South Carolina	1,975	1,975	36,538	38,512	33,615	37,357
Georgia	4,000	4,066	56,000	63,023	47,600	57,351
Florida	700	675	11,200	10,125	8,960	8,302
Ohio	3,650	3,900	142,715	146,250	87,056	92,138
Indiana	4,940	4,900	163,317	176,400	94,724	105,840
Illinois	10,346	10,450	300,034	282,150	183,021	177,754
Michigan	1,750	1,675	63,000	56,112	42,210	37,595
Wisconsin	1,725	1,650	69,862	66,825	45,410	40,095
Minnesota	2,600	2,400	91,000	96,000	47,320	50,880
Iowa	10,248	9,950	389,424	338,300	214,183	202,980
Missouri	7,200	7,375	158,400	129,062	107,712	95,506
North Dakota	500	375	14,000	10,800	8,120	5,616
South Dakota	3,000	2,640	78,000	67,320	39,000	37,699
Nebraska	7,100	7,610	173,950	114,150	92,194	74,198
Kansas	5,850	7,320	108,225	23,424	68,182	18,271
Kentucky	3,650	3,650	91,250	74,825	58,400	56,867
Tennessee	3,350	3,350	80,400	68,675	54,672	52,880
Alabama	3,264	3,200	55,488	55,360	44,390	49,270
Mississippi	3,150	3,150	58,275	63,000	42,541	48,510
Louisiana	2,000	1,900	38,600	41,800	28,950	32,186
Texas	6,400	6,800	124,800	163,200	92,352	133,824
Oklahoma	4,000	4,750	50,000	52,250	32,000	37,620
Arkansas	2,400	2,475	42,000	47,025	33,600	36,690
Montana	50	28	1,400	882	1,064	679
Wyoming	21	17	525	493	368	394
Colorado	462	420	10,626	6,300	6,376	4,599
New Mexico	92	85	2,576	1,572	2,061	1,179
Arizona	18	17	576	476	691	524
Utah	12	10	420	340	315	238
Nevada	1	1	36	34	40	40
Idaho	19	14	589	448	424	305
Washington	36	34	972	952	710	762
Oregon	22	21	660	598	541	419
California	60	55	2,160	1,815	1,879	1,597
United States	103,435	105,820	2,672,804	2,446,988	1,722,070	1,692,092

CORN—Continued.

TABLE 5.—*Corn: Production and distribution in the United States, 1897-1914.*

[000 omitted.]

Year.	Old stock on farms Nov. 1.	Crop.	Total supplies.	Stock on farms Mar. 1 following.	Shipped out of county where grown.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1897	290,894	1,902,968	2,193,862	782,871	411,617
1898	137,894	1,924,185	2,062,079	800,533	396,005
1899	113,644	2,078,144	2,191,788	773,730	348,098
1900	92,328	2,105,103	2,197,431	776,166	478,417
1901	95,825	1,522,520	1,618,345	441,132	153,213
1902	29,267	2,523,648	2,552,915	1,050,653	557,296
1903	131,210	2,244,177	2,375,387	839,053	419,877
1904	80,246	2,467,481	2,547,727	954,268	551,635
1905	82,285	2,707,994	2,790,279	1,108,364	681,539
1906	119,633	2,927,416	3,047,049	1,297,979	679,544
1907	130,995	2,592,320	2,723,315	902,429	467,675
1908	71,124	2,668,651	2,739,775	1,047,763	568,129
1909	79,779	2,552,190	2,631,969	977,561	635,248
1910	115,696	2,886,260	3,001,956	1,165,378	681,777
1911	123,824	2,531,488	2,655,312	884,069	517,704
1912	64,764	3,124,746	3,189,510	1,289,655	680,796
1913	137,072	2,446,988	2,584,060	866,392	422,091
1914	80,046	2,672,804	2,752,850	910,894	498,285

CORN—Continued.

TABLE 6.—*Corn: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1905-1914.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	10-year average, 1905-1914.	1910	1911	1912	1913	1914	5-year average, 1910-1914.	1914
Me.	40.1	34.3	37.0	37.0	40.5	38.0	46.0	44.0	40.0	38.0	46.0	78	71	90	75	87	88	35.16	40.48
N. H.	40.4	37.0	37.5	35.0	39.0	35.1	46.0	45.0	46.0	37.0	46.0	75	69	82	75	81	82	34.17	37.72
Vt.	39.2	34.7	35.5	36.0	40.3	37.0	43.0	41.0	40.0	37.0	47.0	73	66	80	72	81	81	31.60	38.07
Mass.	41.4	37.5	39.7	36.0	40.4	38.0	45.5	44.0	45.0	40.5	47.0	77	70	83	77	85	85	35.48	39.95
R. I.	37.8	32.5	33.1	31.2	42.8	33.2	40.0	45.0	41.5	36.5	42.0	86	83	95	88	99	98	37.95	41.16
Conn.	43.4	42.7	40.0	33.0	41.3	41.0	53.2	48.5	50.0	38.5	46.0	76	68	83	77	85	89	37.72	40.94
N. Y.	35.3	31.5	34.9	27.0	38.8	36.0	38.3	38.5	38.6	28.5	41.0	72	63	77	70	81	83	27.58	34.03
N. J.	36.3	35.8	36.3	31.5	38.0	32.7	36.0	36.8	38.0	39.5	38.5	66	60	71	68	75	76	26.49	29.26
Pa.	39.3	38.9	40.2	32.5	39.5	32.0	41.0	44.5	42.5	39.0	42.5	65	59	68	63	72	73	28.07	31.02
Del.	31.8	30.4	30.0	27.5	32.0	31.0	31.8	34.0	34.0	31.5	36.0	54	62	61	51	59	62	19.10	22.32
Md.	35.1	36.9	35.0	34.2	36.6	31.4	33.5	36.5	36.5	33.0	37.0	58	58	63	55	65	68	21.82	25.16
Va.	24.2	23.4	24.3	25.0	26.0	23.2	25.5	24.0	24.0	26.0	20.5	68	65	73	71	76	81	17.50	16.60
W. Va.	29.8	29.8	30.3	28.0	31.2	31.4	26.0	25.7	33.8	31.0	31.0	70	68	77	65	80	83	21.99	25.73
N. C.	17.6	13.9	15.3	16.5	18.0	16.8	18.6	18.4	18.2	19.5	20.3	78	76	82	83	88	86	15.79	17.46
S. C.	16.2	10.9	12.2	15.1	14.1	16.7	18.5	18.2	17.9	19.5	18.5	85	82	91	85	97	92	16.58	17.02
Ga.	13.6	11.0	12.0	13.0	12.5	13.9	14.5	16.0	13.8	15.5	14.0	80	78	83	85	91	85	12.46	11.90
Fla.	12.7	10.1	11.0	11.3	10.5	12.6	13.0	14.6	13.0	15.0	16.0	78	85	80	79	82	80	11.62	12.80
Ohio.	38.8	37.8	42.6	34.6	38.5	39.5	36.5	38.6	42.8	37.5	39.1	53	46	58	45	63	61	21.18	23.85
Ind.	37.1	40.7	39.6	36.0	30.3	40.0	39.3	36.0	40.3	36.0	33.0	48	40	54	42	60	58	18.57	19.14
Ill.	34.8	39.8	36.1	36.0	31.6	35.9	39.1	33.0	40.0	27.0	29.0	48	38	55	41	63	61	16.82	17.69
Mich.	33.7	34.0	37.0	30.1	31.8	35.4	32.4	33.0	34.0	33.5	36.0	58	53	65	57	67	67	20.91	24.12
Wis.	36.3	37.6	41.2	32.0	33.7	33.0	32.5	36.3	35.7	40.5	40.5	55	52	60	51	60	65	21.50	26.32
Minn.	33.3	32.5	33.6	27.0	29.0	34.8	32.7	33.7	34.5	40.0	35.0	46	45	53	37	53	52	16.95	18.20
Iowa.	34.9	34.8	39.5	29.5	31.7	31.5	36.3	31.0	43.0	34.0	38.0	45	36	53	35	60	55	17.17	20.90
Mo.	28.1	33.8	32.3	31.0	27.0	26.4	33.0	26.0	32.0	17.5	22.0	53	44	60	46	74	68	14.55	14.96
N. Dak.	25.3	27.5	27.8	20.0	23.8	31.0	14.0	25.0	26.7	28.8	28.0	52	58	60	43	52	58	13.16	16.24
S. Dak.	28.1	31.8	33.5	25.5	29.7	31.7	25.0	22.0	30.6	25.5	26.0	44	40	53	37	56	50	12.05	13.00
Nebr.	25.3	32.8	34.1	24.0	27.0	24.8	25.8	21.0	24.0	15.0	24.5	45	36	55	37	65	53	10.49	12.98
Kans.	19.9	27.7	28.9	22.1	22.0	19.9	19.0	14.5	23.0	3.2	18.5	51	45	63	40	78	63	8.21	11.66
Ky.	27.6	29.7	33.0	28.2	25.2	29.0	29.0	26.0	30.4	20.5	25.0	58	53	63	55	76	64	16.01	16.00
Tenn.	24.9	24.6	28.1	26.0	24.8	22.0	25.9	26.8	26.5	20.5	24.0	61	56	61	61	77	68	15.82	16.32
Ala.	16.2	14.8	16.0	15.5	14.7	13.5	18.0	18.0	17.2	17.3	17.0	77	71	78	79	89	80	13.88	13.60
Miss.	17.8	14.3	18.5	17.0	17.3	14.5	20.5	19.0	18.3	20.0	18.5	72	63	72	71	77	73	13.70	13.50
La.	19.3	13.7	17.2	17.5	19.8	23.0	23.6	18.5	18.0	22.0	19.3	68	55	70	68	77	75	13.92	14.48
Tex.	20.0	21.3	22.5	21.0	25.7	15.0	20.6	9.5	21.0	24.0	19.5	66	63	80	64	82	74	13.63	14.43
Okla.	19.1	26.4	33.3	24.4	24.8	17.0	16.0	6.5	18.7	11.0	12.5	51	51	70	41	72	64	7.26	8.00
Ark.	19.8	17.3	23.6	17.2	20.2	18.0	24.0	20.8	20.4	19.0	17.5	66	58	72	67	78	80	14.29	14.00
Mont.	25.8	19.4	23.4	22.5	23.4	35.0	23.0	26.5	25.5	31.5	28.0	78	95	80	70	77	76	21.29	21.28
Wyo.	23.7	26.9	27.0	25.0	28.0	28.0	10.0	15.0	23.0	29.0	25.0	71	66	76	64	80	70	14.68	17.50
Colo.	21.2	23.8	27.9	23.5	20.2	24.2	19.9	14.0	20.8	15.0	23.0	62	60	78	50	73	60	11.60	13.80
N. Mex.	25.9	25.3	29.4	29.0	27.0	31.3	23.0	24.7	22.4	18.5	28.0	79	90	84	75	75	80	18.91	22.40
Ariz.	31.8	27.0	29.5	37.5	33.2	32.1	32.5	33.0	33.0	26.0	32.0	101	110	97	100	110	120	33.99	38.40
Utah.	31.9	36.2	32.0	25.5	29.4	31.4	30.3	35.0	30.0	34.0	35.0	76	84	81	75	70	75	25.27	26.25
Nev.	32.1	.....	.....	.....	.....	.....	30.0	30.5	30.0	34.0	36.0	100	100	90	98	118	110	33.31	39.60
Idaho.	30.3	27.2	28.3	30.0	29.0	30.6	32.0	30.0	32.8	32.0	31.0	70	71	85	70	68	72	23.05	22.32
Wash.	26.8	24.2	25.2	27.0	25.5	27.8	28.0	28.5	27.3	28.0	27.0	73	75	79	77	80	73	21.33	19.71
Oreg.	28.1	23.0	27.6	27.5	27.8	30.7	25.5	28.5	31.5	28.5	30.0	74	80	80	75	70	82	22.74	24.60
Cal.	34.7	32.0	34.9	34.0	32.0	34.8	37.5	36.0	37.0	33.0	36.0	84	80	90	85	88	87	30.84	31.32
U. S.	26.6	28.8	30.3	25.9	26.2	25.5	27.7	23.9	29.2	23.1	25.8	54.5	48.0	61.8	48.7	69.1	64.4	14.99	16.63

[1] Based upon farm price Dec. 1.

CORN—Continued.

TABLE 7.—*Corn: Wholesale price per bushel, 1900–1914.*

Date.	New York.		Baltimore.		Cincinnati.		Chicago.		Detroit.		St. Louis.		San Francisco.	
	No. 2 yellow.		Mixed.		No. 2 mixed.[1]		Contract.		No. 3.		No. 2.		White (per 100 lbs.)	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Dolls.*	*Dolls.*
1900	41	52¼	36⅝	48⅞	32¾	47	30½	40½	31½	37	30½	43	1.00	1.30
1901	45⅞	76	41½	68	38	71½	36	67½	38	67	35	70	1.10	1.75
1902	59	76½	43	77	44	69	43¾	88	47	67	40⅜	69¼	1.30	1.65
1903	49⅞	63	46½	61	40	54½	41	53	38	53⅞	39	55	1.17½	1.37½
1904	53¼	72	49¼	58¾	45¼	58½	42¾	56¼	42	60	42½	57	1.25	1.55
1905	50⅜	65	42	65	44½	59½	42	64½	44¾	59	41½	58½	1.25	1.56
1906	47	61½	45⅝	58	42	55⅝	39	54⅜	43	55	39½	54¼	......	......
1907	49½	78	47	74½	43	71	39¼	66½	43	69½	39	66	1.25	1.60
1908	61	76	59⅜	83¾	54½	83½	56⅛	82	53½	83	54½	81½	1.60	1.90
1909	66½	85½	63½	82	57	78	58¼	77	59	79	58	77	1.72½	1.95
1910	(²)	(²)	50	70½	46	69½	45¼	68	46½	68½	44	68	1.40	1.85
1911	(²)	(²)	48⅞	79	45½	77½	45½	76	45¾	76	43½	77	1.31¼	1.80
1912	54½	70	52	87	47	87	47½	83	48	83½	45	86	1.50	1.97½
1913	54⅝	89¼	52⅛	69	48	81	46⅝	78½	48	78⅝	45	82	1.45	1.87
1914.														
January	60	70	66½	67½	65½	69	60	66	63	64½	63½	68	1.62	1.78
February	70	73½	66½	68	64	68	61	65½	62	63½	64	66½	1.61	1.75
March	74	78½	67½	69½	64½	72	63	70	62½	67½	63	70	1.61	1.63
April	74⅜	79	71	74	69½	73	64	69¼	66½	69	64	69½	1.61	1.63
May	69¼	81	71	76	70	75	67	72¼	67½	73½	66¼	73	1.61	1.75
June	75¾	82½	77	77	71	75	67⅞	78½	71	74	68½	73½	1.72	1.77½
July	75½	82¾	75½	75½	70	85	67½	76	70	70	67	77½	1.67½	1.87½
August	81	93¾	82	89	70½	88½	74	86	79	85	77½	87	1.72	1.92½
September	81½	91	82	89	70	85	72¼	83½	75½	82	77½	82½	1.90	1.93
October	80	84	77	79	74	77½	71¼	76	72½	78	70	76½	1.70	1.90
November	72	86¼	67½	82½	63½	76½	62¾	78½	64	77	63	80	1.80	1.80
December	71⅞	77⅞	69	72⅞	63½	70½	62½	68½	63½	70	62⅝	67⅝	1.80	1.80
Year	60	93¾	66½	89	63½	88½	60	86	62	88	62⅝	87	1.61	1.93

[1] No. 2 grade to 1912. [2] Nominal.

TABLE 8.—*Corn: Condition of crop, United States, on first of months named, 1894–1914.*

Year.	July.	Aug.	Sept.	Oct.	Year.	July.	Aug.	Sept.	Oct.	Year.	July.	Aug.	Sept.	Oct.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1894	95.0	69.1	63.4	64.2	1901	81.3	54.0	51.7	52.1	1908	82.8	82.5	79.4	77.8
1895	99.3	102.5	96.4	95.5	1902	87.5	86.5	84.3	79.6	1909	89.3	84.4	74.6	73.8
1896	92.4	96.0	91.0	90.5	1903	79.4	78.7	80.1	80.8	1910	85.4	79.3	78.2	80.3
1897	82.9	84.2	79.3	77.1	1904	86.4	87.3	84.6	83.9	1911	80.1	69.6	70.3	70.4
1898	90.5	87.0	84.1	82.0	1905	87.3	89.0	89.5	89.2	1912	81.5	80.0	82.1	82.2
1899	86.5	89.9	85.2	82.7	1906	87.5	88.0	90.2	90.1	1913	86.9	75.8	65.1	65.3
1900	89.5	87.5	80.6	78.2	1907	80.2	82.8	80.2	78.0	1914	85.8	74.8	71.7	72.9

CORN—Continued.

TABLE 9.—*Corn: Farm price per bushel on first of each month, by geographical divisions, 1913 and 1914.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	69.6	48.9	78.2	61.9	85.1	74.5	62.4	44.0	60.9	39.0	81.8	61.8	81.6	58.4
February	68.3	50.6	74.6	61.5	86.1	75.9	60.6	46.1	59.0	41.5	81.1	62.2	81.8	61.1
March	69.1	52.2	73.8	63.4	88.6	77.2	61.2	47.1	58.8	42.5	83.1	65.7	76.1	65.6
April	70.7	53.7	75.2	62.5	89.6	79.4	62.8	48.3	61.3	44.2	83.6	67.0	77.2	65.5
May	72.1	56.8	76.7	65.4	91.1	81.7	64.4	51.6	62.3	48.3	85.3	68.8	80.5	62.4
June	75.0	60.6	78.3	67.7	93.2	86.0	67.5	55.3	65.1	52.4	88.6	72.1	81.4	67.9
July	75.5	63.2	80.5	69.3	94.0	86.0	68.8	59.0	65.2	55.1	88.7	74.0	81.8	63.0
August	76.8	65.4	80.8	72.8	94.0	87.9	71.9	61.2	65.6	58.1	89.7	74.8	79.3	67.2
September	81.5	75.4	90.8	81.6	98.6	91.3	78.1	71.6	72.3	70.7	88.7	82.4	80.9	79.0
October	78.2	75.3	89.3	83.6	96.5	90.6	74.6	70.7	68.9	70.4	85.2	83.4	80.4	81.5
November	70.6	70.7	80.0	78.1	89.0	85.8	67.1	64.1	61.6	66.4	76.9	80.8	80.3	78.9
December	64.4	69.1	76.6	74.9	82.9	84.2	61.2	62.3	55.9	62.3	71.5	79.1	70.4	77.2
Average	71.7	60.1	79.1	69.6	90.6	83.5	65.3	53.7	62.2	51.5	81.4	73.1	79.1	68.3

TABLE 10.—*Corn (including meal): International trade, calendar years 1911–1913.*

[The item *maicena* or *maizena* is included as "Corn and corn meal."]

GENERAL NOTE.—*Substantially the international trade of the world. It should not be expected that* the world export and import totals for any year will agree. Among sources of disagreement are these: (1) Different periods of time covered in the "year" of the various countries; (2) Imports received in year subsequent to year of export; (3) want of uniformity in classification of goods among countries; (4) different practices and varying degrees of failure in recording countries of origin and ultimate destination; (5) different practices of recording reexported goods; (6) opposite methods of treating free ports; (7) clerical errors, which, it may be assumed, are not infrequent.

The exports given are domestic exports, and the imports given are imports for consumption as far as it is feasible and consistent so to express the facts. While there are some inevitable omissions, on the other hand there are some duplications because of reshipments that do not appear as such in official reports. For the United Kingdom, import figures refer to imports for consumption, when available, otherwise total imports, less exports, of "foreign and colonial merchandise." Figures for the United States include Alaska, Porto Rico, and Hawaii.

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
	Bushels.	*Bushels.*	*Bushels.*		*Bushels.*	*Bushels.*	*Bushels.*
Argentina	4,928	190,353	189,240	Russia	52,759	30,289	22,898
Austria-Hungary	156	38	30	Servia (¹)	4,627	4,627	4,627
Belgium	8,846	10,999	6,134	United States	63,533	32,627	46,923
British South Africa	3,892	3,756	741	Uruguay	19	14	14
Bulgaria	13,980	11,362	11,362	Other countries	5,076	6,538	6,191
Netherlands	5,939	13,557	11,846				
Roumania	61,233	61,233	36,617	Total	224,988	365,893	336,623

IMPORTS.

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
Austria-Hungary	7,896	29,108	25,844	Netherlands	25,743	38,262	39,467
Belgium	24,814	32,021	25,036	Norway	1,019	1,471	1,130
British South Africa	29	114	818	Portugal	418	952	952
Canada	16,440	9,331	9,041	Russia	339	279	609
Cuba	2,388	2,890	3,196	Spain	5,685	6,851	22,400
Denmark	11,085	18,809	15,938	Sweden	460	3,975	3,975
Egypt	227	116	1,184	Switzerland	4,059	4,342	4,785
France	19,742	23,957	23,278	United Kingdom	77,449	88,166	97,721
Germany	28,367	44,973	36,165	Other countries	3,258	5,668	8,986
Italy	15,118	21,194	13,849				
Mexico	[illegible]	1,548	1,548	Total	254,476	339,115	325,302

WHEAT.

TABLE 11.—*Wheat: Area and production of undermentioned countries, 1912–1914.*

Country.	Area.			Production.		
	1912	1913	1914	1912	1913	1914
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	45,814,000	50,184,000	53,541,000	730,267,000	763,380,000	891,017,000
Canada:						
New Brunswick	13,000	13,000	13,000	236,000	260,000	234,000
Ontario	855,000	850,000	834,000	17,421,000	19,851,000	17,058,000
Manitoba	2,839,000	2,804,000	2,616,000	63,017,000	53,331,000	38,605,000
Saskatchewan	5,582,000	5,720,000	5,348,000	106,960,000	121,559,000	73,494,000
Alberta	1,590,000	1,512,000	1,371,000	34,303,000	34,372,000	28,850,000
Other	118,000	117,000	111,000	2,222,000	2,335,000	2,430,000
Total Canada	10,997,000	11,016,000	10,293,000	224,159,000	231,717,000	161,280,000
Mexico	(1)	(1)	(1)	12,000,000	10,000,000	8,000,000
Total				966,426,000	1,005,097,000	1,060,297,000
SOUTH AMERICA.						
Argentina	17,042,000	17,096,000	16,242,000	160,190,000	187,391,000	113,004,000
Chile	1,093,000	1,103,000	1,151,000	22,468,000	23,575,000	11,986,000
Uruguay	799,000	816,000	911,000	8,757,000	5,461,000	6,887,000
Total				197,415,000	216,427,000	131,777,000
EUROPE.						
Austria-Hungary:						
Austria	3,114,000	2,997,000	(1)	69,712,000	60,100,000	55,000,000
Hungary proper	8,748,000	7,700,000	8,623,000	173,328,000	151,348,000	125,489,000
Croatia-Slavonia	833,000	837,000	741,000	11,314,000	16,809,000	7,716,000
Bosnia-Herzegovinia	247,000	320,000	(1)	2,993,000	3,837,000	2,500,000
Total Austria-Hungary	12,942,000	11,854,000		257,347,000	232,193,000	190,655,000
Belgium	397,000	394,000	400,000	15,348,000	14,769,000	13,973,000
Bulgaria	2,887,000	2,513,000	2,545,000	44,756,000	40,000,000	36,000,000
Denmark	(2)134,000	(1)	(1)	5,045,000	6,602,000	4,700,000
Finland	(1)	(1)	(1)	130,000	130,000	130,000
France	16,979,000	16,166,000	16,049,000	336,284,000	321,000,000	319,687,000
Germany	4,759,000	4,878,000	4,990,000	160,224,000	171,075,000	160,000,000
Greece	(1)	(1)	(1)	7,000,000	7,000,000	7,000,000
Italy	11,751,000	11,842,000	11,783,000	165,720,000	214,405,000	169,442,000
Montenegro	(1)	(1)	(1)	200,000	200,000	200,000
Netherlands	143,000	142,000	145,000	5,001,000	5,164,000	5,380,000
Norway	(2)12,000	(1)	(1)	332,000	325,000	269,000
Portugal	1,120,000	1,208,000	(1)	6,761,000	9,186,000	10,000,000
Roumania	5,114,000	4,011,000	5,218,000	88,924,000	83,236,000	49,270,000
Russia:						
Russia proper	49,581,000			472,390,000		
Poland	1,248,000			24,626,000		
Northern Caucasia	9,839,000			126,746,000		
Total Russia (European)	60,668,000	62,086,000	62,316,000	623,762,000	838,776,000	597,000,000
Servia	956,000	573,000	(1)	16,351,000	10,524,000	9,000,000
Spain	9,625,000	9,644,000	9,681,000	109,783,000	112,401,000	116,089,000
Sweden	260,000	(1)	(1)	7,832,000	9,330,000	8,472,000
Switzerland	105,000	103,000	(1)	3,178,000	3,546,000	3,480,000
Turkey (European)	(1)	(1)	(1)	18,000,000	18,000,000	18,000,000
United Kingdom:						
England	1,822,000	1,663,000	1,770,000	54,004,000	53,736,000	59,308,000
Wales	41,000	38,000	37,000	1,123,000	1,075,000	1,082,000
Scotland	62,000	55,000	61,000	2,471,000	2,335,000	2,641,000
Ireland	45,000	34,000	37,000	1,564,000	1,295,000	1,415,000
Total United Kingdom	1,970,000	1,790,000	1,905,000	59,162,000	58,441,000	64,446,000
Total				1,931,743,000	2,156,393,000	1,783,173,000

[1] No data. [2] Census of 1907.

WHEAT—Continued.

TABLE 11.—*Wheat: Area and production of countries undermentioned, 1912–1914*—Con.

Country.	Area.			Production.		
	1912	1913	1914	1912	1913	1914
ASIA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
British India	31,141,000	29,524,000	27,597,000	370,515,000	362,693,000	314,808,000
Cyprus	(1)	(1)	(1)	2,176,000	2,100,000	2,000,000
Japanese Empire:						
Japan	1,216,000	1,075,000	1,163,000	26,514,000	26,757,000	21,642,000
Formosa	14,000	(1)	(1)	164,000	160,000	160,000
Total Japanese Empire	....	....	....	26,678,000	26,917,000	21,802,000
Persia	(1)	(1)	(1)	16,000,000	16,000,000	14,000,000
Russia:						
Central Asia (4 Governments of)	3,804,000	....	....	36,977,000	....	....
Siberia (4 Governments of)	6,254,000	....	....	59,198,000	....	....
Transcaucasia (1 Government of)	10,000	....	....	105,000	....	....
Total Russia (Asiatic)	10,068,000	(2)13,102,000	(1)	96,280,000	(2)121,042,000	(2)179,960,000
Turkey (Asia Minor only)	(1)	(1)	(1)	35,000,000	35,000,000	35,000,000
Total	....	....	....	546,640,000	563,752,000	567,370,000
AFRICA.						
Algeria	3,614,000	3,448,000	(1)	27,172,000	36,848,000	20,000,000
Egypt	1,332,000	1,355,000	(1)	30,903,000	38,426,000	33,088,000
Tunis	1,263,000	1,235,000	1,058,000	4,225,000	5,511,000	2,205,000
Union of South Africa	(1)	(1)	(1)	(3)6,034,000	(3)6,034,000	6,034,000
Total	....	....	....	68,334,000	86,819,000	71,327,000
AUSTRALASIA.						
Australia:						
Queensland	43,000	125,000	132,000	294,000	2,038,000	1,825,000
New South Wales	2,381,000	2,231,000	3,205,000	25,879,000	33,511,000	39,219,000
Victoria	2,164,000	2,085,000	2,566,000	21,550,000	27,050,000	33,974,000
South Australia	2,191,000	2,080,000	2,268,000	20,994,000	22,174,000	17,470,000
Western Australia	612,000	793,000	1,097,000	4,496,000	9,457,000	13,751,000
Tasmania	37,000	25,000	18,000	681,000	650,000	361,000
Total Australia	7,428,000	7,339,000	9,286,000	73,894,000	94,880,000	106,600,000
New Zealand	216,000	190,000	167,000	7,490,000	5,343,000	5,559,000
Total Australasia	7,644,000	7,429,000	9,453,000	81,384,000	100,223,000	112,159,000
Grand total	....	....	....	3,791,951,000	4,128,711,000	3,726,103,000

[1] No data. [2] Ten governments. [3] Yield in 1911 (census).

WHEAT—Continued.

TABLE 12.—*Wheat: Total production of countries mentioned in Table 11, 1891–1914.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1891	2,432,322,000	1897	2,236,268,000	1903	3,189,813,000	1909	3,581,519,000
1892	2,481,805,000	1898	2,948,305,000	1904	3,163,542,000	1910	3,575,055,000
1893	2,559,174,000	1899	2,783,885,000	1905	3,327,084,000	1911	3,551,795,000
1894	2,660,557,000	1900	2,640,751,000	1906	3,434,354,000	1912	3,791,951,000
1895	2,593,312,000	1901	2,955,975,000	1907	3,133,965,000	1913	4,128,711,000
1896	2,506,320,000	1902	3,090,116,000	1908	3,182,105,000	1914	3,726,103,000

TABLE 13.—*Wheat: Average yield per acre of undermentioned countries, 1890–1913.*

Year.	United States.	Russia (European).[2]	Germany.[1]	Austria.[1]	Hungary proper.[1]	France.[2]	United Kingdom.[2]
Average:	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1890–1899	13.2	8.9	24.5	16.2	....	18.6	31.2
1900–1909	14.1	9.7	28.9	18.0	17.5	20.5	33.1
1904	12.5	11.5	29.5	19.5	16.3	16.5	27.8
1905	14.5	10.0	28.5	19.6	18.7	20.9	33.9
1906	15.5	7.7	30.3	20.3	22.5	20.2	34.8
1907	14.0	8.0	29.6	18.0	14.9	23.2	35.1
1908	14.0	8.8	29.7	21.0	17.5	19.6	33.4
1909	15.4	12.5	30.5	19.0	14.1	22.0	35.0
1910	13.9	11.2	29.6	19.2	19.8	15.9	31.4
1911	12.5	7.0	30.6	19.6	20.9	19.8	34.0
1912	15.9	10.3	33.6	22.3	19.8	21.0	30.0
1913	16.2	([3]) 12.9	35.1	19.9	19.6	19.9	32.7
Average (1904–1913)	14.3	10.0	30.7	19.9	18.4	20.1	32.8

[1] Bushels of 60 pounds. [2] Winchester bushels. [3] Includes 10 Governments of Asiatic Russia.

WHEAT—Continued.

TABLE 14.—*Wheat: Acreage, production, value, exports, etc., in the United States, 1849–1914.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage harvested.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, No. 1 northern spring. December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, including flour, fiscal year beginning July 1.	Per cent of crop exported.
	Acres.	*Bush.*	*Bushels.*	*Cents.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*	*P. ct.*
1849			*100,486,000*							7,535,901	7.5
1859			*173,105,000*							17,213,133	9.9
1866	15,424,000	9.9	152,000,000	152.7	232,110,000	129	145	185	211	12,646,941	8.3
1867	18,322,000	11.6	212,441,000	145.2	308,387,000	126	140	134	161	26,323,014	12.4
1868	18,460,000	12.1	224,037,000	108.5	243,033,000	80	88	87	96	29,717,201	13.3
1869	19,181,000	13.6	260,147,000	76.5	199,025,000	63	76	79	92	53,900,780	20.7
1869			*287,746,000*								
1870	18,993,000	12.4	235,885,000	94.4	222,767,000	91	98	113	120	52,574,111	22.3
1871	19,944,000	11.6	230,722,000	114.5	264,076,000	107	111	120	143	38,995,755	16.9
1872	20,858,000	12.0	249,997,000	111.4	278,522,000	97	108	112	122	52,014,715	20.8
1873	22,172,000	12.7	281,255,000	106.9	300,670,000	96	106	105	114	91,510,398	32.5
1874	24,967,000	12.3	308,103,000	86.3	265,881,000	78	83	78	94	72,912,817	23.7
1875	26,382,000	11.1	292,136,000	89.5	261,397,000	82	91	89	100	74,750,682	25.6
1876	27,627,000	10.5	289,356,000	97.0	280,743,000	104	117	130	172	57,043,936	19.7
1877	26,278,000	13.9	364,194,000	105.7	385,089,000	103	108	98	113	92,141,626	25.3
1878	32,109,000	13.1	420,122,000	77.6	325,814,000	81	84	91	102	150,502,506	35.8
1879	32,546,000	13.8	448,757,000	110.8	497,030,000	122	133½	112½	119	180,304,181	40.2
1879	*35,430,000*	*13.0*	*459,483,000*								
1880	37,987,000	13.1	498,550,000	95.1	474,202,000	93⅝	109¾	101	112⅝	186,321,514	37.4
1881	37,709,000	10.2	383,280,000	119.2	456,880,000	124¾	120	123	140	121,892,389	31.8
1882	37,067,000	13.6	504,185,000	88.4	445,602,000	91¼	94⅞	108	113⅞	147,811,316	29.3
1883	36,456,000	11.6	421,086,000	91.1	383,649,000	94⅜	99½	85	94⅞	111,534,182	26.5
1884	39,476,000	13.0	512,765,000	64.5	330,862,000	69½	76⅝	85⅝	90¾	132,570,366	25.9
1885	34,189,000	10.4	357,112,000	77.1	275,320,000	82⅞	89	72⅜	79	94,565,793	26.5
1886	36,806,000	12.4	457,218,000	68.7	314,226,000	75⅛	79¼	80¾	88¾	153,804,969	33.6
1887	37,642,000	12.1	456,329,000	68.1	310,613,000	75½	79½	81¼	89⅞	119,625,344	26.2
1888	37,336,000	11.1	415,868,000	92.6	385,248,000	96⅞	105½	77⅛	95¾	88,600,743	21.3
1889	38,124,000	12.9	490,560,000	69.8	342,492,000	76¾	80⅜	89¾	100	109,430,467	22.3
1889	*33,580,000*	13.9	*468,374,000*								
1890	36,087,000	11.1	399,262,000	83.8	334,774,000	87½	92⅞	98⅞	108½	106,181,316	26.6
1891	39,917,000	15.3	611,781,000	83.9	513,473,000	89⅜	93¼	90	85⅞	225,665,811	36.9
1892	38,554,000	13.4	515,947,000	62.4	322,112,000	69⅜	73	68½	76¼	191,912,635	37.2
1893	34,629,000	11.4	396,132,000	53.8	213,171,000	59⅜	64½	52⅛	60¼	164,283,129	41.5
1894	34,882,000	13.2	460,267,000	49.1	225,902,000	52¾	63⅜	60⅝	65⅞	144,812,718	31.5
1895	*34,047,000*	*13.7*	*467,103,000*	*50.9*	*237,939,000*	*53¾*	*64⅞*	*57⅛*	*67⅞*	*126,443,968*	*27.1*
1896	34,619,000	12.4	427,684,000	72.6	310,598,000	74⅞	93½	68⅞	97⅞	145,124,972	33.9
1897	39,465,000	13.4	530,149,000	80.8	428,547,000	92	109	117	185	217,306,005	41.0
1898	44,055,000	15.3	675,149,000	58.2	392,770,000	62⅞	70	68⅞	79½	222,618,420	33.0
1899	44,593,000	12.3	547,304,000	58.4	319,545,000	64	69½	63⅞	67½	186,096,762	34.0
1899	*52,589,000*	*12.5*	*658,534,000*								
1900	42,495,000	12.3	522,230,000	61.9	323,515,000	69⅝	74⅞	70	75½	215,990,073	41.4
1901	49,896,000	15.0	748,460,000	62.4	467,350,000	73	79¾	72⅜	76½	234,772,516	31.4
1902	46,202,000	14.5	670,063,000	63.0	422,224,000	71⅞	77¾	74⅞	80⅞	202,905,598	30.3
1903	49,465,000	12.9	637,822,000	69.5	443,025,000	77⅞	87	87¾	101⅞	120,727,613	18.9
1904	44,075,000	12.5	552,400,000	92.4	510,490,000	115	122	89½	113¾	44,112,910	8.0
1905	*47,854,000*	*14.5*	*692,979,000*	*74.8*	*518,373,000*	*82¼*	*90*	*80¼*	*87¼*	*97,609,007*	*14.1*
1906	47,306,000	15.5	735,261,000	66.7	490,333,000			84	106	146,700,425	20.0
1907	45,211,000	14.0	634,087,000	87.4	554,437,000					163,043,669	25.7
1908	47,557,000	14.0	664,602,000	92.8	616,826,000	106½	112	126½	137	114,268,468	17.2
1909	46,723,000	15.8	737,189,000								
1909	*44,261,000*	*15.4*	*683,350,000*	98.6	673,659,000	106	119¾	100	119½	87,364,318	12.8
1910[1]	45,681,000	13.9	635,121,000	88.3	561,051,000	104	116	98	106	69,311,760	10.9
1911	49,543,000	12.5	621,338,000	87.4	543,063,000	105	110	115	123	79,689,404	12.8
1912	45,814,000	15.9	730,267,000	76.0	555,280,000	85	90¾	90½	96	142,879,596	19.6
1913	50,184,000	15.2	763,380,000	79.9	610,122,000	89½	95	96	100	145,590,349	19.1
1914	53,541,000	16.6	891,017,000	98.6	878,680,000	115	131				

[1] Figures adjusted to census basis.

WHEAT—Continued.

TABLE 15.—*Winter and spring wheat: Acreage, production, and farm value Dec. 1, by States in 1914, and United States totals, 1890–1914.*

State and year.	Winter wheat.					Spring wheat.				
	Acreage harvested.	Average yield per acre.	Production.	Average farm price Dec. 1.	Farm value Dec. 1.	Acreage.	Average yield per acre.	Production.	Average farm price Dec. 1.	Farm value Dec. 1.
	Acres.	*Bu.*	*Bushels.*	*Cts.*	*Dollars.*	*Acres.*	*Bu.*	*Bushels.*	*Cts.*	*Dollars.*
Me.						3,000	27.0	81,000	109	88,000
Vt.						1,000	29.0	29,000	100	29,000
N. Y.	360,000	22.5	8,100,000	108	8,748,000					
N. J.	79,000	18.0	1,422,000	109	1,550,000					
Pa.	*1,312,000*	*18.1*	*23,747,000*	*104*	*24,697,000*					
Del.	114,000	20.5	2,337,000	109	2,547,000					
Md.	612,000	21.5	13,158,000	106	13,947,000					
Va.	*779,000*	*14.5*	*11,296,000*	*108*	*12,200,000*					
W. Va.	236,000	15.0	3,540,000	108	3,823,000					
N. C.	611,000	12.0	7,332,000	117	8,578,000					
S. C.	80,000	11.5	920,000	145	1,334,000					
Ga.	140,000	12.1	1,694,000	134	2,270,000					
Ohio.	1,975,000	18.5	36,538,000	105	38,365,000					
Ind.	2,485,000	17.4	43,239,000	103	44,536,000					
Ill.	2,500,000	18.5	46,250,000	101	46,712,000					
Mich.	879,000	19.7	17,316,000	103	17,835,000					
Wis.	85,000	21.5	1,828,000	100	1,828,000	99,000	17.0	1,683,000	100	1,683,000
Minn.	50,000	19.5	975,000	102	994,000	4,000,000	10.5	42,000,000	102	42,840,000
Iowa.	*510,000*	*21.6*	*11,016,000*	*96*	*10,575,000*	*300,000*	*13.5*	*4,050,000*	*96*	*3,888,000*
Mo.	2,549,000	17.0	43,333,000	98	42,466,000					
N. Dak.						7,285,000	11.2	81,592,000	101	82,408,000
S. Dak.	*69,000*	*14.0*	*966,000*	*94*	*908,000*	*3,400,000*	*9.0*	*30,600,000*	*94*	*28,764,000*
Nebr.	3,325,000	19.3	64,172,000	95	60,963,000	343,000	11.5	3,944,000	95	3,747,000
Kans.	8,600,000	20.5	176,300,000	95	167,485,000	60,000	15.0	900,000	95	855,000
Ky.	760,000	16.5	12,540,000	103	12,916,000					
Tenn.	720,000	15.5	11,160,000	105	11,718,000					
Ala.	31,000	13.0	403,000	126	508,000					
Miss.	1,000	13.0	13,000	125	16,000					
Tex.	1,082,000	13.0	14,066,000	99	13,925,000					
Okla.	2,525,000	19.0	47,975,000	92	44,137,000					
Ark.	*125,000*	*13.0*	*1,625,000*	*99*	*1,609,000*					
Mont.	481,000	23.0	11,063,000	91	10,067,000	429,000	17.0	7,293,000	91	6,637,000
Wyo.	45,000	24.0	1,080,000	89	961,000	55,000	22.0	1,210,000	89	1,077,000
Colo.	250,000	25.0	6,250,000	87	5,438,000	225,000	22.5	5,062,000	87	4,404,000
N. Mex.	45,000	25.0	1,125,000	90	1,012,000	31,000	23.0	713,000	90	642,000
Ariz.	31,000	28.0	868,000	125	1,085,000					
Utah.	223,000	25.0	5,575,000	86	4,794,000	68,000	25.0	1,700,000	86	1,462,000
Nev.	18,000	29.0	522,000	95	496,000	27,000	30.0	810,000	95	770,000
Idaho.	339,000	27.5	9,322,000	87	8,110,000	210,000	24.0	5,040,000	87	4,385,000
Wash.	960,000	26.5	25,440,000	100	25,440,000	820,000	20.0	16,400,000	100	16,400,000
Oreg.	622,000	22.0	13,684,000	102	13,958,000	177,000	16.5	2,920,000	102	2,978,000
Cal.	*400,000*	*17.0*	*6,800,000*	*104*	*7,072,000*					
U. S.	36,008,000	19.0	684,990,000	98.6	675,623,000	17,533,000	11.8	206,027,000	98.6	203,057,000
1913	31,699,000	16.5	523,561,000	82.9	433,995,000	18,485,000	13.0	239,819,000	73.4	176,127,000
1912	*26,571,000*	*15.1*	*399,919,000*	*80.9*	*323,572,000*	*19,243,000*	*17.2*	*330,348,000*	*70.1*	*231,708,000*
1911	29,162,000	14.8	430,656,000	88.0	379,151,000	20,381,000	9.4	190,682,000	86.0	163,912,000
1910	27,329,000	15.9	434,142,000	88.1	382,318,000	18,352,000	11.0	200,979,000	88.9	178,733,000
1909[1]	*27,017,000*	*15.5*	*417,781,000*	102.4	427,872,000	*17,243,000*	*15.4*	*266,569,000*	92.6	245,787,000
1908	30,349,000	14.4	437,908,000	93.7	410,330,000	17,208,000	13.2	226,694,000	91.1	206,496,000
1907	28,132,000	14.6	409,442,000	88.2	361,217,000	17,079,000	13.2	224,645,000	86.0	193,220,000
1906	*29,600,000*	*16.7*	*492,888,000*	*68.3*	*336,435,000*	*17,706,000*	*13.7*	*242,373,000*	*63.5*	*153,898,000*
1905	29,864,000	14.3	428,462,000	78.2	334,987,000	17,990,000	14.7	264,517,000	69.3	183,386,000
1904	26,866,000	12.4	332,935,000	97.8	325,611,000	17,209,000	12.8	219,464,000	84.2	184,879,000
1903	*32,511,000*	12.3	*399,867,000*	71.6	286,243,000	*16,954,000*	14.0	237,955,000	65.9	*156,782,000*
1902	28,581,000	14.4	411,789,000	64.8	266,727,000	17,621,000	14.7	258,274,000	60.2	155,497,000
1901	30,240,000	15.2	458,835,000	66.1	303,227,000	19,656,000	14.7	289,626,000	56.7	164,133,000
1900	*26,236,000*	13.3	350,025,000	63.3	221,668,000	*16,259,000*	10.6	172,204,000	59.1	101,847,000
1899	25,358,000	11.5	291,706,000	63.0	183,767,000	19,235,000	13.3	255,598,000	53.1	135,778,000
1898	25,745,000	14.9	382,492,000	62.2	237,736,000	18,310,000	16.0	292,657,000	53.0	155,034,000
1897	22,926,000	14.1	323,616,000	85.1	275,323,000	16,539,000	12.5	206,533,000	74.2	153,224,000
1896	22,794,000	11.8	267,934,000	77.0	206,270,000	11,825,000	13.5	159,750,000	65.3	104,328,000
1895	*22,609,000*	*11.6*	*261,242,000*	*57.8*	*150,944,000*	*11,438,000*	*18.0*	*205,861,000*	*42.3*	*86,995,000*
1894	23,519,000	14.0	329,290,000	49.8	164,022,000	11,364,000	11.5	130,977,000	47.2	61,690,000
1893	23,118,000	12.0	278,469,000	56.3	156,720,000	11,511,000	10.2	117,662,000	48.0	56,451,000
1892	*26,209,000*	*13.7*	*359,416,000*	*65.1*	*234,067,000*	*12,345,000*	*12.7*	*156,531,000*	*56.3*	*88,075,000*
1891	27,524,000	14.7	405,116,000	88.0	356,415,000	12,393,000	16.7	206,665,000	76.0	157,058,000
1890	23,520,000	10.9	256,374,000	87.5	223,362,000	12,367,000	11.4	143,890,000	77.4	111,411,000

[1] Census acreage and production.

WHEAT—Continued.

TABLE 16.—*Winter and spring wheat: Yield per acre in States producing both, for ten years.*

WINTER WHEAT.

State.	Yield per acre (bushels).										
	10-year average.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
Wisconsin	19.2	19.2	16.4	15.5	19.5	20.4	20.0	17.5	19.5	20.1	21.5
Minnesota	......	......	......	......	......	......	......	......	......	16.2	19.5
Iowa	21.2	20.0	22.3	18.5	21.0	21.6	21.2	19.7	23.0	23.4	21.6
South Dakota	......	......	......	......	......	......	......	......	......	9.0	14.0
Nebraska	18.6	20.4	23.2	19.0	17.8	19.4	16.5	13.8	18.0	18.6	19.3
Kansas	14.2	13.9	15.3	11.3	12.8	14.5	14.2	10.8	15.5	13.0	20.5
Montana	26.6	......	......	......	......	32.5	22.0	31.7	24.5	25.6	23.0
Wyoming	26.5	......	......	......	25.0	32.5	25.0	26.0	28.0	25.0	24.0
Colorado	23.6	......	......	......	......	29.7	23.0	18.0	24.5	21.1	25.0
New Mexico	21.7	......	......	......	......	......	20.0	25.0	20.0	18.6	25.0
Arizona	28.7	......	......	......	......	......	22.3	30.0	31.0	32.0	28.0
Utah	22.8	......	......	......	23.0	24.0	20.5	20.0	24.0	23.0	25.0
Nevada	25.1	......	......	......	......	24.0	24.0	23.0	27.5	23.0	29.0
Idaho	28.1	32.0	25.4	26.0	30.0	29.0	23.7	31.5	26.7	27.4	27.5
Washington	26.1	28.3	24.1	29.5	24.5	25.8	20.5	27.3	27.6	27.0	26.5
Oregon	22.9	21.1	22.3	25.5	23.2	21.0	23.7	22.2	26.8	21.4	22.0
United States	15.7	14.3	16.7	14.6	14.4	15.8	15.9	14.8	15.1	16.5	19.0

SPRING WHEAT.

State.	10-year average.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
Wisconsin	16.9	15.8	15.7	13.5	17.5	19.0	18.7	14.5	18.5	18.6	17.0
Minnesota	13.5	13.3	10.9	13.0	12.8	16.8	16.0	10.1	15.5	16.2	10.5
Iowa	15.4	13.8	14.9	12.8	15.5	14.7	20.9	13.8	17.0	17.0	13.5
South Dakota	11.4	13.7	13.4	11.2	12.8	14.1	12.8	4.0	14.2	9.0	9.0
Nebraska	12.9	14.0	14.7	12.0	13.0	14.0	13.9	10.0	14.1	12.0	11.5
Kansas	9.9	14.1	11.4	5.8	5.5	11.5	8.4	4.2	15.0	8.5	15.0
Montana	23.9	23.8	24.0	28.6	24.2	28.6	22.0	25.2	23.5	21.5	17.0
Wyoming	26.2	25.4	28.7	28.5	25.5	27.0	25.0	26.0	29.2	25.0	22.0
Colorado	24.6	25.0	32.5	29.0	21.0	29.4	21.9	19.5	24.0	21.0	22.5
New Mexico	22.5	22.2	25.0	24.0	25.0	24.5	20.0	20.5	22.0	19.0	23.0
Arizona	24.8	22.4	25.2	25.9	26.7	25.0	22.3	25.0	28.0	24.5	23.0
Utah	27.3	26.4	27.4	28.8	27.5	28.5	25.3	27.0	29.2	28.0	25.0
Nevada	30.2	27.0	31.5	32.0	30.0	28.7	29.0	32.5	30.2	31.0	30.0
Idaho	25.3	23.8	23.5	24.5	25.4	26.0	20.4	29.0	28.3	28.0	24.0
Washington	19.6	22.5	19.6	24.5	15.0	20.6	14.5	19.5	20.4	19.0	20.0
Oregon	18.1	16.0	17.5	21.5	16.5	18.7	18.0	17.7	19.5	19.5	16.5
United States	13.3	14.7	13.7	13.2	13.2	15.8	11.0	9.4	17.2	13.0	11.8

WHEAT—Continued.

TABLE 17.—*Wheat: Acreage, production, and total farm value, by States, 1913 and 1914.*

State.	Thousands of acres.		Production (thousands of bushels).		Total value, basis Dec. 1 price (thousands of dollars).	
	1914	1913	1914	1913	1914	1913
Maine	3	3	81	76	88	77
Vermont	1	1	29	24	29	24
New York	360	340	8,100	6,800	8,748	6,324
New Jersey	79	80	1,422	1,408	1,550	1,352
Pennsylvania	1,312	1,286	23,747	21,862	24,697	19,894
Delaware	114	113	2,337	1,638	2,547	1,441
Maryland	612	610	13,158	8,113	13,947	7,221
Virginia	779	780	11,296	10,608	12,200	10,184
West Virginia	236	235	3,540	3,055	3,823	3,055
North Carolina	611	605	7,332	7,078	8,578	7,503
South Carolina	80	79	920	972	1,334	1,264
Georgia	140	140	1,694	1,708	2,270	2,050
Ohio	1,975	1,950	36,538	35,100	38,365	31,590
Indiana	2,485	2,150	43,239	39,775	44,536	34,002
Illinois	2,500	2,240	46,250	41,888	46,712	36,024
Michigan	879	835	17,316	12,776	17,835	11,371
Wisconsin	184	190	3,611	3,665	3,511	3,005
Minnesota	4,050	4,200	42,975	68,040	43,834	51,711
Iowa	810	795	15,006	16,395	14,463	12,480
Missouri	2,549	2,315	43,333	39,586	42,466	33,252
North Dakota	7,285	7,510	81,592	78,855	82,408	57,564
South Dakota	3,469	3,775	31,566	33,975	29,672	24,122
Nebraska	3,668	3,475	68,116	62,325	64,710	44,251
Kansas	8,660	6,710	177,200	86,983	168,340	68,717
Kentucky	760	725	12,540	9,860	12,916	9,466
Tennessee	720	700	11,160	8,400	11,718	8,232
Alabama	31	32	403	374	508	430
Mississippi	1	1	13	14	16	13
Texas	1,082	780	14,066	13,650	13,925	12,831
Oklahoma	2,525	1,750	47,975	17,500	44,137	14,350
Arkansas	125	101	1,625	1,313	1,609	1,182
Montana	910	870	18,356	20,673	16,704	13,644
Wyoming	100	90	2,280	2,250	2,098	1,620
Colorado	475	460	11,312	9,680	9,842	7,551
New Mexico	76	65	1,838	1,221	1,654	1,184
Arizona	31	29	868	928	1,085	1,021
Utah	291	265	7,275	6,420	6,256	4,687
Nevada	45	39	1,332	1,061	1,266	887
Idaho	549	510	14,362	14,094	12,495	8,679
Washington	1,780	2,300	41,640	53,300	41,640	38,909
Oregon	799	750	16,604	15,717	16,936	11,788
California	400	300	6,800	4,200	7,072	3,900
United States	53,541	50,184	891,017	763,380	878,680	610,122

WHEAT—Continued.

Table 18.—*Wheat: Production and distribution in the United States, 1897–1914.*

[000 omitted.]

Year.	Old stock on farms July 1.	Crop.	Total supplies.	Stock on farms Mar. 1 following.	Shipped out of county where grown.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1897	23,347	530,149	553,496	121,320	269,126
1898	17,839	675,149	692,988	198,056	398,882
1899	64,061	547,304	611,365	158,746	305,020
1900	50,900	522,230	573,130	128,098	281,372
1901	*30,552*	*748,460*	*779,012*	*173,353*	*372,717*
1902	52,437	670,063	722,500	164,047	388,554
1903	42,540	637,822	680,362	132,608	369,582
1904	36,634	552,400	589,034	111,055	302,771
1905	24,257	692,979	717,236	158,403	404,092
1906	46,053	735,261	781,314	206,642	427,263
1907	54,853	634,087	688,940	148,721	367,607
1908	33,797	664,602	698,399	143,692	393,435
1909	15,062	683,335	698,397	160,214	417,464
1910	35,929	635,121	671,050	102,705	352,906
1911	34,071	621,338	655,409	122,025	348,821
1912	23,876	730,267	754,143	156,483	449,906
1913	35,515	763,380	798,895	151,809	411,753
1914	32,236	891,017	923,253	152,903	541,198

WHEAT—Continued.

TABLE 19.—*Wheat: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1905–1914.	1905	1906	1907	1908	1909	1910	1911	9112	1913	1914	10-year average, 1905–1914.	1910	1911	1912	1913	1914	5-year average, 1910–1914.	1914
Me.	25.0	23.0	24.8	26.2	23.5	25.5	29.7	21.0	23.5	25.5	27.0	105	102	110	103	101	109	26.56	29.43
Vt.	24.8	18.8	22.3	23.0	23.0	25.0	29.3	27.8	25.0	24.5	29.0	100	103	99	98	100	100	27.14	29.00
N. Y.	19.8	21.0	20.0	17.3	17.5	21.0	23.7	19.5	16.0	20.0	22.5	97	96	95	99	93	108	20.00	24.30
N. J.	17.8	16.4	18.3	18.5	17.3	17.9	18.5	17.4	18.5	17.6	18.0	97	98	96	98	96	109	17.90	19.62
Pa.	17.3	17.1	17.7	18.6	18.5	17.0	17.8	13.5	18.0	17.0	18.1	94	92	92	95	91	104	16.04	18.82
Del.	16.6	13.8	16.0	20.5	15.0	14.0	17.0	16.7	17.5	14.5	20.5	93	90	90	96	88	109	18.45	22.34
Md.	16.5	16.3	16.0	19.0	16.4	14.5	17.4	15.5	15.0	13.3	21.5	93	92	91	95	89	106	15.80	22.79
Va.	12.4	11.4	12.5	12.5	11.4	11.2	12.8	12.0	11.6	13.6	14.5	98	97	96	101	96	108	12.88	15.66
W. Va.	13.0	12.3	12.7	12.2	13.0	13.0	12.5	11.5	14.5	13.0	15.0	100	102	102	101	100	108	13.66	16.20
N. C.	9.9	6.7	9.1	9.5	10.0	9.5	11.4	10.6	8.9	11.7	12.0	108	110	102	111	100	117	11.93	14.04
S. C.	9.8	6.1	9.3	8.5	9.0	10.0	11.0	11.4	9.2	12.3	11.5	126	126	123	119	130	145	14.30	16.68
Ga.	10.1	6.9	10.0	9.0	9.2	10.0	10.5	12.0	9.3	12.2	12.1	121	130	114	122	120	134	13.91	16.21
Ohio	16.2	17.1	20.4	16.3	16.0	15.9	16.2	16.0	8.0	18.0	18.5	93	90	91	98	90	105	14.52	19.42
Ind.	16.0	18.3	20.7	14.4	16.6	15.3	15.6	14.7	8.0	18.5	17.4	91	87	89	93	88	103	13.66	17.92
Ill.	16.0	16.0	19.5	18.0	13.0	17.4	15.0	16.0	8.3	18.7	18.5	89	88	80	88	86	101	13.90	18.68
Mich.	16.4	18.5	13.1	14.5	18.0	18.8	18.0	18.0	10.0	15.3	19.7	92	89	88	96	89	103	15.07	20.29
Wis.	17.7	16.6	16.3	14.1	18.2	19.5	19.3	15.9	19.0	19.3	19.1	88	92	90	83	82	100	16.55	19.10
Minn.	13.5	13.3	10.9	13.0	12.8	16.8	16.0	10.1	15.5	16.2	10.6	86	94	92	73	76	102	11.75	10.81
Iowa	17.4	14.2	15.7	13.4	17.2	17.0	21.0	16.4	19.8	20.0	18.6	82	85	88	78	76	96	16.25	17.86

WHEAT—Continued.

TABLE 20.—*Winter and spring wheat: Condition of crop, United States, on first of months named, 1890–1915.*

Year.	Winter wheat.					Spring wheat.			
	December of previous year.	April.	May.	June.	When harvested.	June.	July.	August.	When harvested.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1890	95.3	81.0	80.0	78.1	76.2	91.3	94.4	83.2	79.7
1891	98.4	96.9	97.9	96.6	96.2	92.6	94.1	95.5	97.2
1892	85.3	81.2	84.0	88.3	89.6	92.3	90.9	87.3	81.2
1893	87.4	77.4	75.4	75.5	77.7	86.4	74.1	67.0	68.9
1894	91.5	86.7	81.4	83.2	83.9	88.0	68.4	67.1	69.9
1895	89.0	81.4	82.9	71.1	65.8	97.8	102.2	95.9	94.9
1896	81.4	77.1	82.7	77.9	75.6	99.9	93.3	78.9	73.8
1897	99.5	81.4	80.2	78.5	81.2	89.6	91.2	86.7	80.8
1898	......	86.7	86.5	90.8	85.7	100.9	95.0	96.5	91.7
1899	92.6	77.9	76.2	67.3	65.6	91.4	91.7	83.6	77.2
1900	97.1	82.1	88.9	82.7	80.8	87.3	55.2	56.4	56.1
1901	97.1	91.7	94.1	87.8	88.3	92.0	95.6	80.3	78.4
1902	86.7	78.7	76.4	76.1	77.0	95.4	92.4	89.7	87.2
1903	99.7	97.3	92.6	82.2	78.8	95.9	82.5	77.1	78.1
1904	86.6	76.5	76.5	77.7	78.7	93.4	93.7	87.5	66.2
1905	82.9	91.6	92.5	85.5	82.7	93.7	91.0	89.2	87.3
1906	94.1	89.1	90.9	82.7	85.6	93.4	91.4	86.9	83.4
1907	94.1	89.9	82.9	77.4	78.3	88.7	87.2	79.4	77.1
1908	91.1	91.3	89.0	86.0	80.6	95.0	89.4	80.7	77.6
1909	85.8	82.2	83.5	80.7	82.4	95.2	92.7	91.6	88.6
1910	95.8	80.8	82.1	80.0	81.5	92.8	61.6	61.0	63.1
1911	82.5	83.3	86.1	80.4	76.8	94.6	73.8	59.8	56.7
1912	86.6	80.6	79.7	74.3	73.3	95.8	89.3	90.4	90.8
1913	93.2	91.6	91.9	83.5	81.6	93.5	73.8	74.1	75.3
1914	97.2	95.6	95.9	92.7	94.1	95.5	92.1	75.5	66.0
1915	88.3	88.8	......	......	......	......	......	......	......

TABLE 21.—*Winter wheat: Per cent of area sown which was abandoned (not harvested).*

Year.	Per cent.	Year.	Per cent.	Year.	Per cent.
1900	11.8	1905	4.6	1910	13.7
1901	6.7	1906	5.5	1911	10.7
1902	15.2	1907	11.2	1912	20.1
1903	2.8	1908	4.2	1913	4.7
1904	15.4	1909	7.5	1914	3.1

WHEAT—Continued.

TABLE 22.—*Wheat: Farm price per bushel on first of each month, by geographical divisions, 1913 and 1914.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	81.0	76.2	93.3	97.7	98.8	103.3	89.6	94.5	76.5	72.4	89.7	88.4	74.5	68.3
February	81.6	79.9	92.8	99.9	99.9	106.1	90.1	97.9	77.1	76.2	90.7	88.5	74.9	73.9
March	83.1	80.6	95.4	100.4	102.6	105.3	89.9	97.0	79.8	76.6	90.0	90.6	75.0	75.9
April	84.2	70.1	95.5	100.9	103.3	106.7	90.4	94.7	80.4	73.9	91.7	89.7	78.4	77.5
May	83.9	80.9	96.9	99.9	103.2	106.5	89.4	96.3	80.0	76.8	91.6	80.2	78.9	77.2
June	84.4	82.7	97.3	101.2	103.0	107.4	90.6	95.9	81.4	79.4	90.7	88.7	76.6	76.3
July	76.9	81.4	93.7	100.2	96.8	102.0	78.3	92.1	74.1	78.7	74.2	82.5	76.0	77.8
August	76.5	77.1	85.8	89.7	90.9	92.8	78.4	82.9	75.2	75.5	74.2	78.7	73.1	74.2
September	93.3	77.1	101.5	89.4	105.1	93.7	98.7	84.4	94.1	75.8	91.0	82.9	81.1	70.8
October	93.5	77.9	104.3	90.6	108.9	95.5	99.7	80.6	91.7	76.1	96.7	88.0	85.0	71.3
November	97.2	77.0	104.2	91.6	111.2	97.4	102.2	85.9	95.0	74.8	98.9	88.8	91.0	70.1
December	98.6	79.9	105.2	91.7	111.0	98.6	102.8	87.8	97.0	75.6	96.6	91.0	95.4	72.7
Average	88.6	78.4	99.7	93.7	102.5	98.4	91.0	88.5	86.7	75.7	85.9	84.3	84.2	71.9

TABLE 23.—*Wheat: Wholesale price per bushel, 1900–1914.*

Date.	New York.		Baltimore.		Chicago.		Detroit.		St. Louis.		Minneapolis.		San Francisco.	
	No. 2 red winter.		No. 2 red.		No. 1 northern spring.		No. 2 red.		No. 2 red winter.		No. 1 northern.		No. 1 California (per 100 lbs.).	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Dolls.*	*Dolls.*
1900	72¾	96¾	70	90	61½	87½	66¾	91½	66½	86¾	62	90½	0.90	1.07
1901	72¾	89¾	69½	85¾	63½	79¾	66½	90½	61¼	88½	60½	77¼	.95	1.06½
1902	73½	94½	66½	87½	67½	95	68¼	93½	63	92½	66¼	80¾	1.06	1.45
1903	78¼	99¾	76½	88¾	70¼	93	74½	94	69¾	94	73¼	100	1.32½	1.55
1904	92½	126½	82	118½	81½	122	92	123	89½	121	84¾	124½	1.23¾	1.50
1905	84¾	125¾	73	119½	82½	124	80	124	82	120	75½	124½	1.35	1.55
1906	77	97	68	91	71	87¼	72	93½	68½	99¼	69¾	85¾	......	......
1907	80	116½	74	111¼	79	122	75	106¼	74½	109½	76¾	119¾	1.22½	1.80½
1908	95¾	115	89	106¾	102	124	89¼	107	89	110	98¼	125	1.55	1.77½
1909	106½	150½	99½	160	103	140	104¾	157	103	166	97½	144½	1.65	2.15
1910	94¼	131	88½	128	100	129½	91	127	92	135	99¼	129¼	1.40	2.05
1911	90¼	105½	87	100½	93	117	83½	100¾	85	108	91¼	112¾	1.35	1.55
1912	98¾	127	94½	116½	85	122	95¾	120	92½	126½	80½	118¾	1.40	1.90
1913	94	114	89¾	109¼	85	96	87¼	116½	83	115	80¾	95	1.55	1.82½
1914.														(1)
January	99½	100½	93¾	96½	90	93½	89	99½	93	99½	85½	90¾	1.51½	1.56¼
February	100	104	97½	101½	91	97½	97½	99	91	96½	88½	96¾	1.55	1.61½
March	103	106	99½	100¾	94	97¾	97¾	98	92	96¾	89¾	94½	1.60	1.62½
April	103½	105	97	100	93¾	97½	97½	99	92	96	88¾	94½	1.55	1.58¾
May	103½	111¾	98	103	96	100	96½	99	93	98½	90½	98½	1.55	1.63½
June	87½	96½	83	101	89	99	86½	97½	75¼	97	84½	95½	1.61½	1.65
July	86½	98½	82¾	95½	88½	109	80	96¼	76	91	85½	104¾	1.52	1.57½
August	94¾	116½	85½	114	94½	127	88	115½	80	104	92¼	123¼	1.52	1.80
September	113	132½	106½	122	108	133	106	122	101½	118½	103¾	129¼	1.57½	1.70
October	111	122½	108½	114¾	105½	117½	103½	114	101	114	104½	115¾	1.66	1.90
November	120½	126	112	115½	114	118¾	112	114½	108	115	112¾	118¾	1.85	2.00
December	125½	136½	115¾	127	115	131	110	127¾	112½	127½	114½	127½	1.90	1.95
Year	86½	136½	82¾	127	88½	133	80	127¾	75¼	127½	84¾	129¼	1.51½	2.00

[1] Northern club.

WHEAT—Continued.

TABLE 24.—*Wheat flour: Wholesale price per barrel, 1900–1914.*

Date.	Chicago.				Cincinnati.		New York.		St. Louis.	
	Winter patents.		Spring patents.		Winter family.		Spring patents.		Winter patents.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1900	$3.40	$4.40	$3.00	$4.30	$2.35	$3.50	$3.25	$5.00	$3.35	$4.25
1901	3.30	3.90	3.25	3.80	2.20	3.25	3.30	4.25	3.30	4.10
1902	3.40	4.00	3.20	3.90	2.70	3.35	3.50	4.25	3.10	4.25
1903	3.40	4.20	3.30	4.60	2.65	3.55	3.55	5.00	3.35	4.40
1904	4.00	5.50	4.00	6.00	3.25	4.70	4.30	6.60	4.25	5.75
1905	3.85	5.20	3.75	5.70	3.10	4.70	4.25	6.35	4.05	5.60
1906	3.20	4.10	3.55	4.15	2.70	3.60	3.75	4.80	3.35	4.60
1907	3.10	5.10	2.70	5.75	2.70	4.30	3.80	6.00	3.50	5.00
1908	4.00	5.10	4.90	5.75	3.25	4.10	4.85	5.00	4.35	5.10
1909	4.65	6.75	5.35	7.00	3.95	5.85	4.80	6.85	4.60	7.00
1910	4.00	5.80	6.00	7.00	3.10	5.10	4.80	6.35	4.35	6.20
1911	3.60	5.40	5.10	6.55	2.60	3.70	4.45	5.75	3.90	5.25
1912	3.75	5.45	4.00	5.60	3.40	4.50	4.25	6.00	4.20	5.85
1913	3.90	4.90	4.00	5.60	2.90	4.15	4.40	5.00	3.70	5.15
1914.										
January	4.15	4.40	4.00	5.30	3.20	3.50	4.55	4.80	4.15	4.35
February	4.15	4.40	4.15	5.50	3.20	3.50	4.55	5.00	4.00	4.30
March	4.10	4.40	4.20	5.50	3.20	3.50	4.60	5.10	3.90	4.20
April	4.10	4.35	4.20	5.30	3.20	3.50	4.50	4.85	3.75	4.00
May	4.10	4.40	4.10	5.30	3.20	3.50	4.50	5.00	3.75	4.10
June	3.50	4.40	4.25	5.30	3.20	3.50	4.50	5.00	3.35	4.00
July	3.45	4.35	4.00	5.50	3.05	3.50	4.35	5.50	3.35	3.80
August	4.10	5.10	4.50	6.90	3.30	4.45	5.00	6.50	3.70	5.10
September	4.90	5.50	5.35	6.90	4.25	4.65	5.50	7.00	4.65	5.25
October	4.90	5.30	5.15	6.20	4.25	4.65	5.50	6.10	4.65	5.00
November	5.10	5.50	5.30	6.20	4.50	4.65	5.65	6.00	4.75	5.10
December	5.10	5.25	5.40	6.60	4.50	4.90	5.65	6.50	4.70	5.70
Year	3.45	5.50	4.00	6.90	3.05	4.90	4.35	7.00	3.35	5.70

WHEAT—Continued.

TABLE 25.—*Wheat and flour: International trade, calendar years 1911–1913.*

["Temporary" imports into Italy of wheat, to be used for manufacturing products for export, are included in the total imports as given in the official Italian returns. In the trade returns of Chile the item *trigo mote* (prepared corn) which might easily be confused with *trigo* (wheat) is omitted. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	Wheat.			Flour.			Wheat and flour.(1)		
	1911	1912	1913 (prelim.)	1911	1912	1913 (prelim.)	1911	1912	1913 (prelim.)
	Bushels.	*Bushels.*	*Bushels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Bushels.*	*Bushels.*	*Bushels.*
Argentina	83,993	96,600	103,328	1,333	1,480	1,402	89,991	103,260	109,637
Australia	55,148	32,604	42,923	1,816	1,739	2,285	63,319	40,128	53,207
Austria-Hungary	15	56	71	122	167	369	566	806	1,729
Belgium	22,723	16,576	12,991	750	732	646	26,099	19,870	15,898
British India	52,557	65,598	50,558	581	714	923	55,171	68,812	54,711
Bulgaria	11,122	9,238	9,238	756	493	493	14,524	11,456	11,456
Canada	60,474	84,958	129,950	8,542	4,303	4,894	70,414	104,320	151,975
Chile	509	2,411	1,921	69	74	63	821	2,743	2,205
Germany	11,390	11,853	19,781	1,820	1,924	2,191	19,581	20,510	29,638
Netherlands	46,171	51,444	63,598	191	157	201	47,028	52,152	64,501
Roumania	53,586	53,596	41,563	730	730	1,447	56,872	56,872	48,076
Russia	144,779	96,915	122,246	1,355	1,173	1,505	150,875	102,195	129,018
Servia (2)	3,366	3,366	3,366	80	80	[2] 80	3,727	3,727	3,727
United States	32,669	61,665	99,509	11,258	10,622	12,278	83,330	109,451	154,760
Other countries	18,815	12,839	12,940	2,945	3,303	[2] 3,248	32,065	27,708	27,560
Total	597,317	599,699	713,982	27,348	27,691	32,025	720,383	724,310	858,096

IMPORTS.

Country.	Wheat 1911	Wheat 1912	Wheat 1913 (prelim.)	Flour 1911	Flour 1912	Flour 1913 (prelim.)	Wheat and flour 1911	Wheat and flour 1912	Wheat and flour 1913 (prelim.)
Belgium	82,192	71,167	69,628	47	21	36	82,405	71,261	69,790
Brazil	12,241	14,010	16,109	1,786	2,133	1,914	20,277	23,609	24,722
British South Africa	2,919	1,886	5,359	722	588	890	6,170	4,531	9,368
Denmark	3,060	5,885	5,176	597	680	670	5,736	8,496	8,190
France	78,995	26,131	57,149	155	126	113	79,695	26,698	57,658
Germany	91,430	84,415	93,547	172	179	201	92,204	85,218	94,451
Greece	7,934	5,901	6,882	14	16	15	7,999	5,974	6,950
Italy	43,300	65,760	66,527	18	34	23	43,383	65,914	66,630
Japan	2,019	2,276	2,276	200	191	191	2,921	3,135	3,135
Netherlands	58,570	65,788	79,369	2,242	2,051	2,259	68,657	75,018	89,534
Portugal	439	2,382	2,382	....	....	....	439	2,382	2,382
Spain	4,927	1,543	6,405	1	1	1	4,930	1,547	6,409
Sweden	6,333	6,285	6,285	79	74	74	6,689	6,619	6,619
Switzerland	16,142	17,843	19,446	515	494	429	18,460	20,066	21,376
United Kingdom	182,352	203,322	196,809	5,682	5,742	6,704	207,919	229,160	226,978
Other countries	20,305	11,109	25,643	11,732	11,497	12,250	73,093	62,847	80,769
Total	613,158	585,703	638,982	23,964	23,727	25,770	720,997	692,475	754,959

[1] Flour is reduced to terms of grain, where included in these 3 columns, by assuming 1 barrel of flour to be the product of 4½ bushels of wheat.

[2] Data for 1911.

OATS.

TABLE 26.—*Oats: Area and production of undermentioned countries, 1912–1914.*

Country.	Area.			Production.		
	1912	1913	1914	1912	1913	1914
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	37,917,000	38,399,000	38,442,000	1,418,337,000	1,121,768,000	1,141,060,000
Canada:						
New Brunswick	195,000	195,000	200,000	5,607,000	5,946,000	6,488,000
Quebec	1,296,000	1,303,000	1,327,000	33,516,000	39,025,000	42,119,000
Ontario	2,785,000	2,814,000	2,840,000	97,053,000	105,159,000	99,400,000
Manitoba	1,348,000	1,398,000	1,331,000	57,154,000	56,759,000	31,951,000
Saskatchewan	2,556,000	2,755,000	2,520,000	117,537,000	114,112,000	61,816,000
Alberta	1,461,000	1,639,000	1,502,000	67,630,000	71,542,000	57,076,000
Other	325,000	330,000	341,000	13,132,000	12,126,000	14,228,000
Total Canada	9,966,000	10,434,000	10,061,000	391,629,000	404,669,000	313,078,000
Mexico	(1)	(1)	(1)	17,000	17,000	17,000
Total	....	....	....	1,809,983,000	1,526,454,000	1,454,155,000
SOUTH AMERICA.						
Argentina	2,548,000	2,946,000	3,087,000	69,169,000	75,783,000	50,981,000
Chile	69,000	94,000	....	3,380,000	4,443,000	4,000,000
Uruguay	86,000	50,000	97,000	1,825,000	872,000	1,850,000
Total	....	....	....	74,374,000	81,098,000	56,831,000
EUROPE.						
Austria-Hungary:						
Austria	4,613,000	4,707,000	(1)	146,376,000	160,068,000	150,000,000
Hungary proper	2,473,000	2,884,000	2,655,000	76,768,000	99,807,000	90,568,000
Croatia-Slavonia	239,000	256,000	(1)	3,311,000	6,163,000	4,000,000
Bosnia-Herzegovina	203,000	299,000	(1)	4,760,000	4,796,000	3,000,000
Total Austria-Hungary	7,528,000	8,146,000	....	231,221,000	270,834,000	247,568,000
Belgium	648,000	671,000	686,000	35,086,000	47,957,000	49,742,000
Bulgaria	435,000	400,000	(1)	8,707,000	8,000,000	8,000,000
Denmark	1,059,000	(1)	(1)	44,868,000	46,755,000	48,000,000
Finland	(1)	(1)	(1)	26,618,000	22,924,000	18,678,000
France	9,840,000	9,833,000	9,848,000	313,656,000	311,157,000	325,000,000
Germany	10,841,000	10,967,000	11,148,000	586,967,000	669,231,000	620,000,000
Italy	1,254,000	1,251,000	1,213,000	28,306,000	43,469,000	26,827,000
Netherlands	341,000	348,000	346,000	16,317,000	21,117,000	19,958,000
Norway	(2) 263,000	(1)	(1)	11,607,000	11,734,000	9,325,000
Roumania	943,000	1,290,000	1,056,000	20,775,000	35,138,000	25,015,000
Russia:						
Russia proper	37,270,000	....	....	862,783,000	....	....
Poland	2,832,000	....	....	80,807,000	....	....
Northern Caucasia	1,117,000	....	....	29,677,000	....	....
Total Russia (European)	41,219,000	42,040,000	42,694,000	973,267,000	1,105,578,000	800,000,000
Servia	262,000	272,000	(1)	5,477,000	5,512,000	5,000,000
Spain	1,279,000	1,351,600	1,304,000	23,036,000	25,333,000	31,227,000
Sweden	1,952,000	(1)	(1)	87,766,000	99,815,000	52,557,000
United Kingdom:						
England	1,866,000	1,772,000	1,730,000	68,431,000	70,404,000	71,667,000
Wales	207,000	202,000	200,000	7,040,000	6,992,000	7,431,000
Scotland	956,000	938,000	920,000	37,928,000	37,148,000	38,115,000
Ireland	1,046,000	1,049,000	1,029,000	66,867,000	66,103,000	63,287,000
Total United Kingdom	4,075,000	3,961,000	3,879,000	180,266,000	180,647,000	180,500,000
Total	....	....	....	2,593,959,000	2,905,201,000	2,467,287,000

OATS—Continued.

TABLE 26.—*Oats: Area and production of undermentioned countries, 1912–1914*—Contd.

Country.	Area.			Production.		
	1912	1913	1914	1912	1913	1914
ASIA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
Cyprus	(1)	(1)	(1)	378,000	400,000	400,000
Russia:						
Central Asia[2]	860,000	......	(1)	17,501,000	......	......
Siberia[3]	3,893,000	......	(1)	76,664,000	......	......
Transcaucasia[3]	2,000	......	(1)	65,000	......	......
Total Russia (Asiatic)	4,755,000	(4)5,734,000	......	94,320,000	(4)121,068,000	[4]162,506,000
Total	......	......	......	94,698,000	121,468,000	162,906,000
AFRICA.						
Algeria	476,000	539,000	(1)	12,351,000	17,973,000	10,000,000
Tunis	124,000	133,000	99,000	2,067,000	4,133,000	689,000
Union of South Africa	(1)	(1)	(1)	(5)9,661,000	(5)9,661,000	(5)9,661,000
Total	......	......	......	24,079,000	31,767,000	20,350,000
AUSTRALASIA.						
Australia:						
Queensland	1,000	4,000	(1)	6,000	85,000	58,000
New South Wales	71,000	85,000	(1)	1,191,000	1,725,000	1,863,000
Victoria	302,000	439,000	(1)	4,730,000	8,586,000	9,170,000
South Australia	108,000	156,000	(1)	1,392,000	1,726,000	1,239,000
Western Australia	84,000	128,000	(1)	992,000	2,175,000	1,708,000
Tasmania	51,000	62,000	(1)	1,552,000	2,328,000	1,644,000
Total Australia	617,000	874,000	859,000	9,863,000	16,625,000	15,712,000
New Zealand	404,000	387,000	362,000	10,438,000	14,013,000	15,206,000
Total Australasia	1,021,000	1,261,000	......	20,301,000	30,638,000	30,918,000
Grand total	......	......	......	4,617,394,000	4,696,640,000	4,198,508,000

[1] No official statistics.
[2] Four governments.
[3] One government.
[4] Ten governments.
[5] Yield in 1911 (census).

TABLE 27.—*Oats: Average yield per acre of undermentioned countries, 1890–1913.*

Year.	United States.	Russia (European).[1]	Germany.[1]	Austria.[1]	Hungary proper.[1]	France.[2]	United Kingdom.[2]
Average:	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1890–1899	26.1	17.8	40.0	25.3	......	29.8	43.6
1900–1909	29.3	20.0	50.7	29.8	30.7	31.6	44.3
1904	32.1	25.7	40.2	24.8	25.6	27.2	44.2
1905	34.0	20.2	43.6	27.7	31.0	28.6	41.7
1906	31.2	15.1	56.7	34.1	34.2	27.0	43.8
1907	23.7	19.7	58.3	35.7	30.0	31.8	45.1
1908	25.0	20.1	50.2	32.0	26.8	29.0	43.5
1909	28.6	25.7	59.0	37.4	33.8	34.1	45.9
1910	31.6	22.5	51.3	31.5	26.8	29.8	44.3
1911	24.4	18.0	49.6	33.7	33.8	30.8	41.5
1912	37.4	23.6	54.1	36.2	31.1	31.9	41.7
1913	29.2	[3]24.6	61.1	39.3	34.6	31.6	43.0
Average (1904–1913)	29.7	21.6	52.0	33.2	30.7	30.3	43.7

[1] Bushels of 32 pounds.
[2] Winchester bushels.
[3] Includes 10 governments of Asiatic Russia.

TABLE 28.—*Oats: Total production in countries named in Table 26, 1895–1914.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1895	3,068,154,000	1900	3,186,902,000	1905	3,510,197,000	1910	4,182,410,000
1896	2,947,115,000	1901	2,962,615,000	1906	3,544,961,000	1911	3,898,861,000
1897	2,682,971,000	1902	3,628,263,000	1907	3,603,896,000	1912	4,617,394,000
1898	2,933,974,000	1903	3,378,684,000	1908	3,301,012,000	1913	4,696,640,000
1899	3,256,256,000	1904	3,611,362,000	1909	4,312,892,000	1914	4,198,508,000

OATS—Continued.

TABLE 29.—*Oats: Acreage, production, value, exports, etc., in the United States, 1849–1914.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value, Dec. 1.	Chicago cash price per bushel, contract.[1] December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, including oatmeal, fiscal year beginning July 1.[2]	Imports during fiscal year beginning July 1.[3]
	Acres.	*Bush.*	*Bushels.*	*Cts.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*	*Bushels.*
1849	....	......	*146,584,000*	......	....	......	......	......	......	....	....
1859	....	......	*172,643,000*	......	....	......	......	......	......	....	....
1866	8,864,000	30.2	268,141,000	35.1	94,058,000	36	43	59	78	825,895	778,198
1867	10,746,000	25.9	278,698,000	44.5	123,903,000	52	57¼	......	......	122,554	780,798
1868	9,666,000	26.4	254,961,000	41.7	106,356,000	43	49½	56¾	62½	481,871	326,659
1869	9,461,000	30.5	288,334,000	38.0	109,522,000	40	44¾	40½	53½	121,517	2,266,785
1869	....	......	*282,107,000*	......	....	......	......	......	......	....	....
1870	8,792,000	28.1	247,277,000	39.0	96,444,000	37¾	41	47¼	51	147,572	599,514
1871	8,366,000	30.6	255,743,000	36.2	92,591,000	30¾	33	34¾	42½	262,975	535,250
1872	9,001,000	30.2	271,747,000	29.9	81,304,000	23½	25⅜	30	34	714,072	225,555
1873	9,752,000	27.7	270,340,000	34.6	93,474,000	34	40⅝	44	48½	812,873	191,802
1874	10,897,000	22.1	240,369,000	47.1	113,134,000	51¾	54½	57¼	64½	504,770	1,500,040
1875	11,915,000	29.7	354,318,000	32.0	113,441,000	29½	30⅛	28⅝	31½	1,466,228	121,547
1876	13,359,000	24.0	320,884,000	32.4	103,845,000	31¾	34½	37¼	45¾	2,854,128	41,597
1877	12,826,000	31.7	406,394,000	28.4	115,546,000	24⅛	27	23	27	3,715,479	21,391
1878	13,176,000	31.4	413,579,000	24.6	101,752,000	19⅝	20⅝	24⅜	30½	5,452,136	13,395
1879	12,684,000	28.7	363,761,000	33.1	120,533,000	32¾	36¾	29½	34⅞	766,366	489,576
1879	*16,145,000*	*25.3*	*407,859,000*	......	....	......	......	......	......	....	....
1880	16,188,000	25.8	417,885,000	36.0	150,244,000	29⅛	33½	36¼	39⅛	402,904	64,412
1881	16,832,000	24.7	416,481,000	46.4	193,199,000	43½	46¾	48¾	56⅞	625,690	1,850,983
1882	18,495,000	26.4	488,251,000	37.5	182,978,000	34¾	41½	38¾	42¾	461,496	815,017
1883	20,325,000	28.1	571,302,000	32.7	187,040,000	29⅝	36⅛	30¾	34½	3,274,622	121,009
1884	21,301,000	27.4	583,628,000	27.7	161,528,000	22½	25¼	34⅜	37	6,203,104	94,310
1885	22,784,000	27.6	629,409,000	28.5	179,632,000	27	29	26¼	29⅝	7,311,306	149,480
1886	23,658,000	26.4	624,134,000	29.8	186,138,000	25⅜	27¼	25⅛	27½	1,374,635	139,575
1887	25,921,000	25.4	659,618,000	30.4	200,700,000	28⅝	30⅞	32⅛	38	573,080	123,817
1888	26,998,000	26.0	701,735,000	27.8	195,424,000	25	26⅞	21⅞	23⅝	1,191,471	131,501
1889	27,462,000	27.4	751,515,000	22.9	171,781,000	20	21	24¾	30	15,107,238	153,232
1889	*28,321,000*	*28.6*	*809,251,000*	......	....	......	......	......	......	....	....
1890	26,431,000	19.8	523,621,000	42.4	222,048,000	39⅞	43⅞	45¼	54	1,382,836	41,848
1891	25,582,000	28.9	738,394,000	31.5	232,312,000	31⅛	33⅝	28⅛	33½	10,586,644	47,782
1892	27,064,000	24.4	661,035,000	31.7	209,254,000	25⅝	31¼	28⅝	32¼	2,700,793	49,433
1893	27,273,000	23.4	638,855,000	29.4	187,576,000	27⅛	29⅛	32⅛	36	6,290,229	31,759
1894	27,024,000	24.5	662,037,000	32.4	214,817,000	28⅜	29⅝	27½	30¾	1,708,824	330,318
1895	27,878,000	29.6	824,444,000	19.9	163,655,000	16⅝	17⅛	18	19⅝	15,156,618	66,602
1896	27,566,000	25.7	707,346,000	18.7	132,485,000	16¼	18⅝	16⅞	18¼	37,725,083	131,204
1897	25,730,000	27.2	698,768,000	21.2	147,975,000	21	23⅞	26	32	73,880,307	25,093
1898	25,777,000	28.4	730,907,000	25.5	186,405,000	26	27¾	24	27⅞	33,534,362	28,098
1899	26,341,000	30.2	796,178,000	24.9	198,168,000	22¼	23	21¼	23¾	45,048,857	54,576
1899	*29,540,000*	*31.9*	*943,389,000*	......	....	......	......	......	......	....	....
1900	27,365,000	29.6	809,126,000	25.8	208,669,000	21⅝	22⅞	27⅝	31	42,268,931	32,107
1901	28,541,000	25.8	736,809,000	39.9	293,659,000	42	48¼	41	49½	13,277,612	38,978
1902	28,653,000	34.5	987,843,000	30.7	303,585,000	29¼	32	33¼	38¼	8,381,805	150,065
1903	27,638,000	28.4	784,094,000	34.1	267,662,000	34¼	38	39⅝	44¾	1,960,740	189,983
1904	27,843,000	32.1	894,596,000	31.3	279,900,000	28¼	32	28⅜	33	8,394,692	55,699
1905	28,047,000	34.0	953,216,000	29.1	277,048,000	29½	32⅝	32¼	34¾	48,434,541	40,025
1906	30,959,000	31.2	964,905,000	31.7	306,293,000	33	35¾	44¼	48⅝	6,386,334	91,299
1907	31,837,000	23.7	754,443,000	44.3	334,568,000	46½	50¼	52⅝	56½	2,518,855	383,418
1908	32,344,000	25.0	807,156,000	47.2	381,171,000	48⅝	50¼	56¼	62½	2,333,817	6,691,788
1909	33,204,000	30.3	1,007,353,000	......	....	......	......	......	......	....	....
1909	*35,159,000*	*28.6*	*1,007,129,000*	40.2	405,120,000	40	45	36¼	43¼	2,548,726	1,084,511
1910[4]	37,548,000	31.6	1,186,341,000	34.4	408,388,000	31	32¼	31⅞	36	3,845,850	107,318
1911	37,763,000	24.4	922,298,000	45.0	414,663,000	46⅞	47¾	50¾	58	2,677,749	2,622,357
1912	37,917,000	37.4	1,418,337,000	31.9	452,469,000	31	31¾	35¼	43	36,455,474	723,899
1913	38,399,000	29.2	1,121,768,000	39.2	439,596,000	37⅛	40¼	37	42¼	2,748,743	22,273,624
1914	38,442,000	29.7	1,141,060,000	43.8	499,431,000	46⅞	49¾	......	......	....	....

[1] Quotations are for No. 2 to 1906.
[2] Oatmeal not included 1866 to 1882, inclusive.
[3] Oatmeal not included 1867 to 1882, inclusive, and 1908.
[4] Figures adjusted to census basis.

OATS—Continued.

TABLE 30.—*Oats: Acreage, production, and total farm value, by States, 1913 and 1914.*

State.	Thousands of acres.		Production (thousands of bushels).		Value, basis Dec. 1 price (thousands of dollars).	
	1914	1913	1914	1913	1914	1913
Maine	141	140	5,781	5,600	3,295	3,080
New Hampshire	12	12	456	420	264	235
Vermont	79	79	3,358	3,081	1,847	1,603
Massachusetts	9	9	333	315	186	170
Rhode Island	2	2	55	52	32	26
Connecticut	11	11	319	308	175	169
New York	1,275	1,275	40,162	42,712	20,483	20,075
New Jersey	67	70	1,943	2,050	1,049	954
Pennsylvania	1,073	1,154	32,190	35,774	16,417	16,450
Delaware	4	4	108	122	54	62
Maryland	43	45	1,161	1,260	604	605
Virginia	191	195	2,960	4,192	1,717	2,180
West Virginia	105	115	2,100	2,760	1,155	1,408
North Carolina	250	230	4,375	4,485	2,844	2,736
South Carolina	375	360	7,500	8,460	5,325	6,007
Georgia	450	420	9,000	9,240	6,300	6,289
Florida	50	50	900	900	630	630
Ohio	1,650	1,600	50,325	54,300	22,646	21,744
Indiana	1,575	1,700	44,888	36,380	19,302	13,824
Illinois	4,300	4,375	125,990	104,125	55,436	39,568
Michigan	1,515	1,500	50,752	45,000	22,838	17,550
Wisconsin	2,300	2,275	62,100	83,038	26,703	30,724
Minnesota	3,040	2,980	85,120	112,644	34,048	36,046
Iowa	5,000	4,880	165,000	108,360	67,650	37,242
Missouri	1,200	1,250	25,800	26,500	11,352	11,925
North Dakota	2,318	2,250	64,904	57,825	24,014	17,348
South Dakota	1,606	1,590	44,165	42,135	16,783	14,326
Nebraska	2,175	2,250	69,600	59,625	27,840	22,658
Kansas	1,760	1,760	68,960	34,320	24,763	15,444
Kentucky	175	160	3,675	3,168	1,948	1,647
Tennessee	350	300	8,050	9,300	4,266	3,339
Alabama	390	325	8,580	6,662	5,920	4,597
Mississippi	160	140	3,680	2,900	2,392	1,764
Louisiana	70	45	1,610	990	1,014	564
Texas	900	1,000	22,500	32,500	10,800	16,575
Oklahoma	1,100	1,030	30,250	18,540	12,402	8,343
Arkansas	260	240	6,240	6,360	3,307	3,371
Montana	530	500	18,550	21,750	7,234	6,960
Wyoming	225	220	7,675	8,360	3,780	3,344
Colorado	325	305	13,000	10,675	5,850	4,697
New Mexico	52	50	1,976	1,500	889	600
Arizona	8	7	336	301	235	150
Utah	95	90	4,750	4,140	2,042	1,656
Nevada	13	11	676	473	372	307
Idaho	332	325	14,608	15,112	5,551	4,836
Washington	297	300	13,959	14,250	5,863	5,700
Oregon	364	360	12,740	15,228	5,733	5,787
California	220	210	7,700	6,636	4,081	3,982
United States	38,442	38,399	1,141,060	1,121,768	499,431	439,596

OATS—Continued.

TABLE 31.—*Oats: Production and distribution in the United States, 1897–1914.*

[000 omitted.]

Year.	Old stock on farms Aug. 1.	Crop.	Total supplies.	Stock on farms Mar. 1, following.	Shipped out of county where grown.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1897	71,139	698,768	769,907	271,729	204,147
1898	44,554	730,907	775,461	283,209	193,527
1899	50,537	796,178	846,715	290,937	223,014
1900	54,214	809,126	863,340	292,803	242,850
1901	47,713	736,809	784,522	226,393	143,398
1902	30,570	987,843	1,018,413	364,926	258,438
1903	73,352	784,094	857,446	273,708	223,959
1904	42,194	894,596	936,790	347,166	261,989
1905	55,836	953,216	1,009,052	379,805	277,133
1906	67,688	964,905	1,032,593	384,461	286,182
1907	68,258	754,443	822,701	267,476	210,923
1908	37,797	807,156	844,953	278,847	244,444
1909	26,323	1,007,130	1,033,453	365,432	329,252
1910	64,199	1,186,341	1,250,540	442,665	363,103
1911	67,793	922,298	990,091	289,988	265,958
1912	34,872	1,418,337	1,453,209	604,216	438,084
1913	103,900	1,121,768	1,225,668	419,476	297,326
1914	62,467	1,141,060	1,203,527	379,369	335,539

OATS—Continued.

TABLE 32.—*Oats: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels). 10-year average, 1905-1914.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	Farm price per bushel (cents). 10-year average, 1905-1914.	1910	1911	1912	1913	1914	Value per acre (dollars).[1] 5-year average, 1910-1914.	1914
Me.	37.9	38.5	35.8	37.1	34.0	37.0	42.4	38.5	34.6	40.0	41.0	53	48	54	51	55	57	20.83	23.37
N. H.	35.0	32.8	34.5	32.5	30.6	31.5	42.8	33.8	39.0	35.0	38.0	54	51	61	48	56	58	20.56	22.04
Vt.	37.7	39.4	37.2	34.0	33.3	32.2	41.5	35.0	43.0	39.0	42.5	52	50	59	48	52	55	21.14	23.38
Mass.	34.2	32.0	34.0	35.0	33.0	31.0	35.5	35.0	34.0	35.0	37.0	53	50	58	47	54	56	18.73	20.72
R. I.	*29.0*	*29.4*	*29.3*	*29.5*	*31.0*	*25.0*	*35.0*	*20.0*	*28.6*	*28.0*	*27.5*	*55*	*46*	*56*	*45*	*50*	*58*	*16.09*	*15.95*
Conn.	32.0	34.5	34.2	31.5	32.6	27.5	36.8	35.1	30.7	28.0	29.0	51	44	56	49	56	55	16.45	15.95
N. Y.	31.5	34.2	32.3	30.7	30.1	28.2	34.5	29.5	30.8	33.5	31.5	47	42	51	42	47	51	14.85	16.06
N. J.	29.6	32.0	28.6	29.5	30.7	25.5	37.1	28.5	27.6	29.0	29.0	48	44	50	44	47	54	14.40	15.66
Pa.	30.2	34.0	27.4	29.6	27.3	26.0	35.2	28.3	33.1	31.0	30.0	46	41	50	41	46	51	14.34	15.30
Del.	29.3	31.2	24.5	30.0	29.8	25.5	33.8	30.0	30.5	30.5	27.0	47	43	47	45	51	50	14.28	13.50
Md.	27.4	27.7	25.4	27.5	26.5	25.4	30.0	27.0	30.0	28.0	27.0	46	46	49	45	48	52	13.60	14.04
Va.	19.5	17.8	18.0	19.6	19.1	19.0	22.0	20.0	23.2	21.5	15.5	51	40	54	52	52	58	10.66	8.99
W. Va.	22.4	24.1	20.6	19.3	19.0	22.0	25.2	22.0	28.0	24.0	20.0	50	50	56	47	51	55	12.26	11.00
N. C.	17.0	15.3	16.2	15.6	18.5	16.5	18.2	16.5	18.6	19.5	17.5	60	60	63	62	61	65	11.23	11.38
S. C.	20.2	16.3	18.5	20.0	20.0	21.0	21.0	20.4	21.5	23.5	20.0	68	65	72	66	71	71	14.68	14.20
Ga.	18.6	15.1	15.5	16.7	17.2	19.0	18.2	21.5	20.8	22.0	20.0	66	64	70	65	68	70	13.84	14.00
Fla.	15.4	12.0	14.0	13.7	14.5	17.0	16.2	13.5	17.2	18.0	18.0	69	65	75	70	70	70	11.58	12.60
Ohio.	32.4	35.8	32.8	22.8	26.4	32.5	37.2	32.1	44.0	30.2	30.5	40	35	45	33	40	45	13.56	13.73
Ind.	29.0	35.3	28.2	20.2	21.2	30.5	35.4	28.7	40.1	21.4	28.5	37	31	43	30	38	43	11.15	12.26
Ill.	31.2	35.5	29.5	24.5	23.0	36.6	38.0	28.8	43.3	23.8	29.3	37	30	42	30	38	44	11.68	12.89
Mich.	30.8	35.6	30.7	20.8	29.7	30.5	34.0	28.6	34.9	30.0	33.5	40	35	46	33	39	45	12.67	15.08
Wis.	32.5	39.0	37.4	22.0	31.1	35.0	29.8	29.8	37.3	36.5	27.0	38	34	45	32	37	43	12.12	11.61
Minn.	30.8	37.5	32.5	24.5	22.0	33.0	28.7	22.8	41.7	37.8	28.0	34	32	40	28	32	40	10.49	11.20
Iowa.	31.9	35.0	33.8	24.2	24.3	27.0	37.8	25.5	44.2	34.5	33.0	34	27	41	27	34	41	11.57	13.53
Mo.	24.2	27.2	22.8	21.5	19.3	27.0	33.6	14.8	33.0	21.2	21.5	39	32	45	35	45	44	9.59	9.46
N. Dak.	27.7	38.9	32.5	24.5	23.4	32.0	7.0	23.5	41.4	25.7	28.0	33	37	41	22	30	37	7.88	10.36
S. Dak.	27.1	39.0	36.4	24.7	23.0	30.0	23.0	7.4	33.8	26.5	27.5	33	30	43	25	34	38	7.60	10.45
Nebr.	25.3	31.0	29.5	20.4	22.0	25.0	28.6	13.9	24.4	26.5	32.0	34	28	43	30	38	40	8.80	12.80
Kans.	24.9	27.1	23.6	15.0	22.0	28.2	33.3	15.0	32.0	19.5	33.5	39	34	45	35	45	42	10.42	14.07
Ky.	21.3	24.5	21.5	17.6	16.2	22.3	25.0	18.4	26.9	19.8	21.0	47	45	50	44	52	53	10.74	11.13
Tenn.	21.2	20.2	21.5	20.8	21.0	20.0	23.0	19.5	21.7	21.0	23.0	48	46	50	47	53	53	10.77	12.19
Ala.	18.6	16.5	17.2	17.5	18.0	16.5	18.5	19.2	20.0	20.5	22.0	63	60	66	62	60	69	13.10	15.18
Miss.	18.6	18.5	18.0	17.9	17.5	16.0	19.2	18.4	17.4	20.0	23.0	61	55	65	60	63	65	12.10	14.95
La.	19.6	16.0	17.2	14.5	20.0	20.0	21.5	21.0	20.8	22.0	23.0	56	49	65	51	57	63	12.37	14.49
Tex.	28.6	31.4	34.8	19.0	28.9	18.7	35.0	25.1	36.0	32.5	25.0	50	47	54	43	51	48	14.81	12.00
Okla.	25.4	34.2	34.3	15.0	25.0	29.0	36.5	9.0	25.1	18.0	27.5	40	37	48	34	45	41	9.15	11.28
Ark.	22.2	20.3	20.5	19.5	21.4	22.8	27.5	20.0	19.9	26.5	24.0	50	46	53	50	53	53	11.99	12.72
Mont.	44.1	41.3	43.2	49.0	41.6	51.3	38.0	49.8	48.0	43.5	35.0	42	46	40	35	32	39	16.35	13.65
Wyo.	36.9	39.9	39.5	37.9	36.4	35.0	32.0	34.5	41.8	38.0	35.0	46	50	50	37	40	48	16.14	16.80
Colo.	38.3	35.8	40.4	38.0	39.5	38.0	39.1	35.0	42.8	35.0	40.0	46	46	48	38	44	45	16.89	18.00
N. Mex.	34.5	29.5	34.6	38.5	33.5	40.0	27.4	38.8	34.7	30.0	38.0	56	62	57	45	60	45	17.97	17.10
Ariz.	37.9	31.2	34.4	29.0	36.0	37.0	40.1	42.0	44.7	43.0	42.0	68	90	60	70	50	70	28.70	29.40
Utah.	45.4	39.8	43.7	45.0	49.5	46.1	43.0	44.7	46.4	46.0	50.0	46	48	47	49	40	43	20.86	21.50
Nev.	42.9	37.2	38.8	43.0	45.0	40.0	44.7	45.0	40.0	43.0	52.0	61	63	62	52	65	55	26.65	28.60
Idaho.	44.1	39.4	40.7	50.5	44.0	44.5	38.5	44.0	48.9	46.5	44.0	41	42	40	36	32	38	16.50	16.72
Wash.	47.9	50.0	42.2	55.5	44.5	49.0	42.8	51.7	48.2	47.5	47.0	44	48	45	40	40	42	20.36	19.74
Oreg.	34.9	24.1	33.8	35.0	33.4	37.8	34.5	34.7	38.2	42.3	35.0	44	47	44	41	38	45	15.79	15.75
Cal.	33.4	28.0	31.5	33.5	33.5	31.4	37.0	34.0	39.0	31.6	35.0	58	50	59	56	60	53	19.50	18.55
U. S.	29.6	34.0	31.2	23.7	25.0	30.3	31.6	24.4	37.4	29.2	29.7	38.7	34.4	45.0	31.9	39.2	43.8	11.65	12.99

[1] Based upon farm price Dec. 1.

OATS—Continued.

TABLE 33.—*Oats: Farm price per bushel on first of each month, by geographical divisions, 1913 and 1914.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	39.1	32.2	47.0	41.8	63.4	58.9	37.8	31.6	35.1	27.9	51.3	43.5	39.0	38.6
February	39.3	32.4	48.3	41.8	63.0	61.8	37.4	31.6	34.9	27.9	54.8	44.2	39.5	39.6
March	38.9	33.1	48.0	42.2	62.9	60.0	37.4	32.0	34.7	29.0	52.8	46.2	38.8	30.3
April	39.5	33.1	48.8	43.0	62.4	60.4	38.3	31.8	35.1	28.9	52.5	45.5	39.7	40.3
May	39.5	34.2	49.0	45.0	61.9	58.7	38.2	32.6	34.8	30.5	52.2	46.0	41.8	40.4
June	40.0	36.0	49.4	46.0	62.4	60.0	38.7	35.0	35.9	32.2	51.5	45.8	40.6	42.6
July	38.8	37.7	49.6	47.1	62.6	58.3	37.7	37.1	34.6	34.7	45.1	42.3	41.8	43.2
August	36.7	37.6	49.5	47.2	60.0	58.2	36.1	37.2	31.6	34.3	44.2	42.2	39.4	43.1
September	42.3	39.3	53.2	47.3	63.9	60.2	42.8	38.5	38.1	36.6	47.8	47.0	40.9	41.7
October	43.3	39.6	51.7	47.8	66.4	61.2	43.2	30.4	39.9	36.3	49.3	49.9	41.8	40.8
November	42.9	37.9	51.1	45.8	65.2	62.2	43.2	37.6	39.2	34.4	49.7	49.7	40.8	40.1
December	43.8	39.2	51.7	47.4	66.3	63.4	44.0	38.2	40.2	34.9	49.7	52.0	43.3	38.9
Average	40.9	36.8	50.1	45.5	63.5	60.2	40.5	35.9	36.9	33.2	48.2	45.7	41.0	40.3

TABLE 34.—*Oats: Condition of crop, United States, on first of months named, 1894–1914.*

Year.	June.	July.	August.	When harvested.	Year.	June.	July.	August.	When harvested.	Year.	June.	July.	August.	When harvested.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1894	87.0	77.7	76.5	77.8	1901	85.3	83.7	73.6	72.1	1908	92.9	85.7	76.8	69.7
1895	84.3	83.2	84.5	86.0	1902	90.6	92.1	89.4	87.2	1909	88.7	88.3	85.5	83.8
1896	98.8	96.3	77.3	74.0	1903	85.5	84.3	79.5	75.7	1910	91.0	82.2	81.5	83.3
1897	89.0	87.5	86.0	84.6	1904	89.2	89.8	86.6	85.6	1911	85.7	68.8	65.7	64.5
1898	98.0	92.8	84.2	79.0	1905	92.9	92.1	90.8	90.3	1912	91.1	89.2	90.3	92.3
1899	88.7	90.0	90.8	87.2	1906	85.9	84.0	82.8	81.9	1913	87.0	76.3	73.8	74.0
1900	91.7	85.5	85.0	82.9	1907	81.6	81.0	75.6	65.5	1914	89.5	84.7	79.4	73.8

OATS—Continued.

TABLE 35.—*Oats: Wholesale price per bushel, 1900–1914.*

Date.	New York.		Baltimore.		Cincinnati.		Chicago.		Milwaukee.		Duluth.		Detroit.		San Francisco.	
	No. 2 white.		No. 3 white.		No. 2 mixed.		Contract.		No. 3 white.		No. 3 white.		Standard.		White (per 100 lbs.).	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Dols.*	*Dols.*
1900..	28½	32½	24	31¼	21	28	21	26¼	24	29	22½	27½	24	29¼	1.22½	1.40
1901..	32	55	30	53½	25	50¾	23½	48½	25¼	48¾	25	46¾	28	60½	1.02½	1.55
1902..	31	69	31	64	27	57	25	56	30½	58	27½	46⅞	34¾	61	1.15	1.50
1903..	39½	47½	37	46½	31½	43½	31½	45	33½	41	30½	39	35¼	45	1.17½	1.37½
1904..	35¼	58½	33½	49½	31	44½	28¼	46	28½	45	27¾	43	31¾	48¼	1.25	1.60
1905..	30	38½	27½	38¼	35	35½	25	34¼	27½	35½	25	32¾	26¼	37	1.37½	1.60
1906..	35½	48	34	47	30	43	28¾	42¾	29	43	28¼	41	32	43¼	....	.....
1907..	41	68	40	63	37	55½	33½	56¼	32¾	56	33⅞	53	37	58	1.30	1.85
1908..	56½	59	51	63¼	47	60	46	60½	45	62¼	45¾	57	47	64	1.40	1.75
1909..	55¼	63½	38½	64	35½	62	36½	62½	35½	62½	33	58½	36½	64½	1.55	2.25
1910..	30½	62½	35¼	53½	31½	52	29¾	49	30¼	49½	29	47½	34	51	1.42½	1.75
1911..	35½	55	34¾	53½	31	51½	28⅝	47⅝	29¾	49	28⅝	47⅛	32	51	1.35	1.85
1912..	38½	64½	35	64½	32	61	30¼	58¾	30¾	59¾	28¼	56¼	33¼	63¼	1.47½	2.12½
1913..	41¼	50	35¼	48	33½	47	31⅜	43⅝	31¼	42½	27¼	42⅛	34¼	45⅛	1.37½	1.67½
1914.																
Jan...	45	46½	43¼	44¼	40½	42	37⅜	39	37½	39½	34⅜	37⅜	40½	43	1.40	1.46½
Feb..	45	47	43½	44½	40½	43	38⅝	39¼	38	43	35¼	38⅜	41¾	42	1.25	1.45
Mar..	45½	47	44¼	45	41	43	37⅞	39⅝	38	40¾	35⅞	38⅝	41	42½	1.25	1.32½
Apr..	43½	45½	42½	44	40	43	37	39⅜	37¾	40½	34¼	36⅞	41	42¾	1.22½	1.32½
May..	44½	48½	42½	45¾	39½	42½	37	42¼	38¾	42	36½	40	40½	45	1.22½	1.31¼
June .	44¾	47½	43	46¾	39¼	42	36⅜	40¾	36½	41½	33⅜	39⅞	39½	43½	1.22½	1.31¼
July..	43¾	46	41¾	43½	35	39½	34½	39⅞	35½	38½	33¼	36½	37¼	41½	1.20	1.27½
Aug..	43½	56	41½	53	35	51½	33½	48⅞	34¼	49½	34¼	47⅞	41	53	1.23¾	1.32½
Sept..	50	58½	50	55½	46½	52½	44	51½	44	52	42½	50⅝	48½	53	1.30	1.60
Oct...	50	55	49½	52	47	49	44¾	48¾	44½	49	43⅝	47¾	46½	51	1.42½	1.65
Nov..	53	54¾	51¼	53½	48¾	50½	47½	50	46⅝	50	44⅝	47	49½	51	1.50	1.55
Dec ..	53	56	52½	54½	49½	51	46⅞	49¾	47¼	50	44⅝	49½	50½	52½	1.50	1.55
Year.	43½	58½	41½	55½	35	52½	33½	51⅛	34¼	52	33⅛	50⅝	37¾	53	1.20	1.60

TABLE 36.—*Oats: International trade, calendar years 1911–1913.*

[See "General note," p. 517.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
	Bushels.	*Bushels.*	*Bushels.*		*Bushels.*	*Bushels.*	*Bushels.*
Argentina..........	35,232	61,731	61,298	Roumania.........	16,073	1,979	12,150
Bulgaria...........	488	173	173	Russia..............	96,071	58,457	41,120
Canada.............	8,357	9,660	21,732	Sweden............	1,936	361	361
China...............	437	515	285	United Kingdom...	1,948	631	1,655
Chile................	1,096	2,714	3,087	United States......	2,126	30,374	5,275
Denmark...........	79	179	194	Other countries....	1,595	5,365	1,793
Finland.............	453	390	456				
Germany...........	20,411	26,538	45,564	Total........	215,297	240,333	238,900
Netherlands.......	28,995	41,316	31,131				

IMPORTS.

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
Austria-Hungary...	8,190	1,043	1,047	Philippine Islands.	152	770	587
Belgium............	7,419	9,560	9,555	Russia..............	1,122	1,200	2,367
Denmark...........	4,244	3,911	4,224	Sweden.............	7,031	6,703	6,708
Cuba................	1,147	1,432	1,803	Switzerland........	12,588	12,661	12,266
Finland.............	1,488	1,070	1,002	United Kingdom...	64,870	64,924	64,470
France..............	37,316	14,929	39,092	United States......	100	3,263	13,360
Germany...........	42,287	45,879	34,702	Other countries....	2,110	2,678	2,302
Italy.................	8,960	10,880	7,331				
Netherlands.......	25,680	51,304	38,711	Total........	236,580	232,978	240,441
Norway.............	879	822	390				

BARLEY.

TABLE 37.—*Barley: Area and production of undermentioned countries, 1912–1914.*

Country.	Area.			Production.		
	1912	1913	1914	1912	1913	1914
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	7,530,000	7,499,000	7,565,000	223,824,000	178,189,000	194,953,000
Canada:						
New Brunswick	3,000	2,000	2,000	74,000	74,000	64,000
Quebec	94,000	89,000	85,000	2,226,000	2,263,000	2,261,000
Ontario	512,000	495,000	461,000	15,093,000	14,589,000	13,987,000
Manitoba	481,000	496,000	408,000	15,826,000	14,305,000	9,828,000
Saskatchewan	292,000	332,000	290,000	9,575,000	10,421,000	4,901,000
Alberta	187,000	197,000	178,000	6,179,000	6,334,000	4,806,000
Other	13,000	12,000	12,000	405,000	333,000	354,000
Total Canada	1,552,000	1,613,000	1,496,000	49,376,000	48,319,000	36,201,000
Mexico	(1)	(1)	(1)	6,500,000	7,000,000	6,000,000
Total	....	....	....	279,702,000	233,508,000	237,154,000
SOUTH AMERICA.						
Argentina	167,000	368,000	418,000	2,798,000	4,455,000	8,037,000
Chili	103,000	131,000	124,000	3,251,000	4,596,000	5,741,000
Uruguay	*6,000*	*3,000*	*14,000*	*84,000*	*38,000*	*165,000*
Total	....	....	....	6,133,000	9,089,000	13,944,000
EUROPE.						
Austria Hungary:						
Austria	2,634,000	2,699,000	(1)	74,145,000	75,917,000	75,000,000
Hungary proper	2,603,000	2,887,000	2,777,000	70,140,000	79,825,000	67,146,000
Croatia-Slavonia	156,000	158,000	(1)	1,978,000	2,956,000	1,940,000
Bosnia-Herzegovina	220,000	263,000	(1)	2,857,000	3,904,000	3,000,000
Total Austria-Hungary	5,613,000	6,007,000	....	149,120,000	162,602,000	147,086,000
Belgium	84,000	84,000	84,000	4,253,000	4,217,000	4,232,000
Bulgaria	619,000	558,000	(1)	12,440,000	10,000,000	10,000,000
Denmark	597,000	(1)	(1)	23,539,000	24,997,000	20,000,000
Finland	(1)	(1)	(1)	6,754,000	5,414,000	4,047,000
France	1,877,000	1,878,000	1,826,000	49,079,000	46,116,000	47,000,000
Germany	3,928,000	4,087,000	4,010,000	159,924,000	188,703,000	140,000,000
Italy	604,000	620,000	610,000	8,403,000	10,803,000	6,917,000
Netherlands	66,000	66,000	67,000	3,364,000	3,132,000	3,210,000
Norway	(2) 89,000	(1)	(1)	3,086,000	3,202,000	2,591,000
Roumania	1,235,000	1,390,000	1,405,000	21,295,000	27,339,000	25,505,000
Russia:						
Russia proper	23,057,000	....	....	354,685,000	....	....
Poland	1,256,000	....	....	29,821,000	....	....
Northern Caucasia	3,807,000	....	....	71,952,000	....	....
Total Russia (European)	28,120,000	30,165,000	30,844,000	455,958,000	557,575,000	400,000,000
Servia	257,000	149,000	(1)	4,777,000	2,866,000	3,000,000
Spain	3,298,000	3,869,000	3,404,000	59,994,000	68,772,000	72,222,000
Sweden	436,000	437,000	437,000	13,660,000	16,912,000	12,195,000
United Kingdom:						
England	1,365,000	1,470,000	1,420,000	42,897,000	49,384,000	48,210,000
Wales	92,000	89,000	84,000	2,839,000	2,792,000	2,743,000
Scotland	192,000	198,000	194,000	7,117,000	7,598,000	7,616,000
Ireland	165,000	173,000	172,000	7,259,000	8,004,000	8,073,000
Total United Kingdom	1,814,000	1,930,000	1,870,000	60,112,000	67,778,000	66,642,000
Total	....	....	....	1,035,758,000	1,200,434,000	985,438,000

[1] No official statistics. [2] Area in 1907 (census).

BARLEY—Continued.

TABLE 37.—*Barley: Area and production of undermentioned countries, 1912–1914*—Con.

<table>
<tr><th rowspan="2">Country.</th><th colspan="3">Area.</th><th colspan="3">Production.</th></tr>
<tr><th>1912</th><th>1913</th><th>1914</th><th>1912</th><th>1913</th><th>1914</th></tr>
<tr><td>ASIA.</td><td>Acres.</td><td>Acres.</td><td>Acres.</td><td>Bushels.</td><td>Bushels.</td><td>Bushels.</td></tr>
<tr><td>British India</td><td>8,433,000</td><td>(1)</td><td>(1)</td><td>(1)</td><td>(1)</td><td>(1)</td></tr>
<tr><td>Cyprus</td><td>(1)</td><td>(1)</td><td>(1)</td><td>1,838,000</td><td>2,100,000</td><td>2,000,000</td></tr>
<tr><td>Japanese Empire:</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Japan</td><td>3,132,000</td><td>3,296,000</td><td>3,293,000</td><td>90,559,000</td><td>101,477,000</td><td>102,757,000</td></tr>
<tr><td>Formosa</td><td>5,000</td><td>(1)</td><td>(1)</td><td>60,000</td><td>60,000</td><td>60,000</td></tr>
<tr><td>Total Japanese Empire</td><td></td><td></td><td></td><td>90,619,000</td><td>101,537,000</td><td>102,817,000</td></tr>
<tr><td>Russia:</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Central Asia [2]</td><td>375,000</td><td></td><td></td><td>5,578,000</td><td></td><td></td></tr>
<tr><td>Siberia [3]</td><td>436,000</td><td></td><td></td><td>6,585,000</td><td></td><td></td></tr>
<tr><td>Transcaucasia [4]</td><td>2,000</td><td></td><td></td><td>30,000</td><td></td><td></td></tr>
<tr><td>Total Russia (Asiatic)</td><td>813,000</td><td>(4) 1,032,000</td><td>(1)</td><td>12,193,000</td><td>(4) 14,783,000</td><td>(4) 19,561,000</td></tr>
<tr><td>Total</td><td></td><td></td><td></td><td>104,650,000</td><td>118,420,000</td><td>124,378,000</td></tr>
<tr><td>AFRICA.</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Algeria</td><td>3,430,000</td><td>3,152,000</td><td>(1)</td><td>32,887,000</td><td>50,031,000</td><td rowspan="2">39,000,000</td></tr>
<tr><td>Tunis</td><td>1,119,000</td><td>1,117,000</td><td>(1)</td><td>3,070,000</td><td>7,266,000</td></tr>
<tr><td>Union of South Africa</td><td>(1)</td><td>(1)</td><td>(1)</td><td>(5) 1,359,000</td><td>(5) 1,359,000</td><td>(5) 1,359,000</td></tr>
<tr><td>Total</td><td></td><td></td><td></td><td>37,316,000</td><td>58,656,000</td><td>40,359,000</td></tr>
<tr><td>AUSTRALASIA.</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Australia:</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Queensland</td><td>2,000</td><td>9,000</td><td></td><td>16,000</td><td>151,000</td><td>120,000</td></tr>
<tr><td>New South Wales</td><td>11,000</td><td>17,000</td><td></td><td>133,000</td><td>349,000</td><td>312,000</td></tr>
<tr><td>Victoria</td><td>53,000</td><td>72,000</td><td></td><td>1,057,000</td><td>1,800,000</td><td>1,670,000</td></tr>
<tr><td>South Australia</td><td>41,000</td><td>69,000</td><td></td><td>725,000</td><td>1,360,000</td><td>1,375,000</td></tr>
<tr><td>Western Australia</td><td>4,000</td><td>6,000</td><td></td><td>38,000</td><td>96,000</td><td>173,000</td></tr>
<tr><td>Tasmania</td><td>6,000</td><td>8,000</td><td></td><td>153,000</td><td>274,000</td><td>193,000</td></tr>
<tr><td>Total Australia</td><td>117,000</td><td>181,000</td><td></td><td>2,122,000</td><td>4,030,000</td><td>4,043,000</td></tr>
<tr><td>New Zealand</td><td>32,000</td><td>37,000</td><td>32,000</td><td>1,296,000</td><td>1,421,000</td><td>1,234,000</td></tr>
<tr><td>Total Australasia</td><td>149,000</td><td>218,000</td><td></td><td>3,418,000</td><td>5,451,000</td><td>5,277,000</td></tr>
<tr><td>Grand total</td><td></td><td></td><td></td><td>1,466,977,000</td><td>1,625,558,000</td><td>1,385,808,000</td></tr>
</table>

[1] No official statistics.
[2] Four governments.
[3] One government.
[4] Ten governments.
[5] Figures for 1911 (census).

BARLEY—Continued.

TABLE 38.—*Barley: Total production of countries mentioned in Table 37, 1895–1914.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1895	915,504,000	1900	959,022,000	1905	1,180,053,000	1910	1,388,734,000
1896	932,100,000	1901	1,072,195,000	1906	1,296,579,000	1911	1,373,286,000
1897	864,605,000	1902	1,229,132,000	1907	1,271,237,000	1912	1,466,977,000
1898	1,030,581,000	1903	1,235,786,000	1908	1,274,897,000	1913	1,625,558,000
1899	965,720,000	1904	1,175,784,000	1909	1,458,263,000	1914	1,379,888,000

TABLE 39.—*Barley: Average yield per acre of undermentioned countries, 1890–1913.*

Year.	United States.	Russia (European).[1]	Germany.[1]	Austria.[1]	Hungary proper.[1]	France.[2]	United Kingdom.[2]
Average:	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1890–1899	23.4	13.3	29.4	21.1	....	22.6	30.8
1900–1909	25.5	14.3	35.3	26.3	23.4	23.6	35.0
1904	27.2	14.4	33.7	22.8	19.7	22.0	32.3
1905	26.8	14.3	33.3	24.0	24.5	23.4	35.9
1906	28.3	13.0	35.2	26.1	26.8	20.8	36.1
1907	23.8	14.2	38.2	27.3	23.1	24.4	36.8
1908	25.1	14.2	34.9	25.2	21.3	22.6	34.9
1909	22.5	17.9	39.5	28.4	25.1	25.4	38.9
1910	22.5	16.3	34.4	24.9	19.7	23.5	34.3
1911	21.0	14.4	37.0	27.5	26.9	25.0	34.0
1912	29.7	16.2	40.7	29.7	26.9	26.1	33.1
1913	23.8	[3] 18.4	41.3	29.7	27.6	24.5	35.1
Average (1904–1913)	25.1	15.3	36.8	26.6	24.0	23.9	35.1

[1] Bushels of 48 pounds. [2] Winchester bushels. [3] Includes 10 governments of Asiatic Russia.

BARLEY—Continued.

TABLE 40.—*Barley: Acreage, production, value, exports, etc., in the United States, 1849–1914.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, low malting to fancy.[1] December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, fiscal year beginning July 1.	Imports, fiscal year beginning July 1.
	Acres.	*Bush.*	*Bushels.*	*Cents.*	*Dollars.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Bushels.*	*Bushels.*
1849			*5,167,000*								
1859			*15,826,000*								
1866	493,000	22.9	11,284,000	70.2	7,916,000	59	70	85	100		3,247,250
1867	1,131,000	22.7	25,727,000	70.1	18,028,000	150	180	227	250	9,810	3,783,906
1868	937,000	24.4	22,896,000	109.0	24,948,000	140	170	149	175	59,077	5,069,590
1869	1,026,000	27.9	28,652,000	70.8	20,298,000	74	85	50	62	255,490	6,727,597
1869			*29,761,000*								
1870	1,109,000	23.7	26,295,000	79.1	20,792,000	68	80	72	95	340,093	4,866,700
1871	1,114,000	24.0	26,718,000	75.8	20,264,000	55½	64	55	71	86,891	5,565,501
1872	1,397,000	19.2	26,846,000	68.6	18,416,000	60	70	71	85	482,410	4,244,751
1873	1,387,000	23.1	32,044,000	86.7	27,794,000	132	158	130	155	320,399	4,891,189
1874	1,581,000	20.6	32,552,000	86.0	27,998,000	120	129½	115	137	91,118	6,255,063
1875	1,790,000	20.6	36,909,000	74.1	27,368,000	81	88	62½	72½	317,781	10,285,957
1876	1,767,000	21.9	38,710,000	63.0	24,403,000	63¾	68½	80	85	1,186,129	6,702,965
1877	1,669,000	21.4	35,638,000	62.5	22,287,000	56¼	64	46½	52½	3,921,501	6,764,228
1878	1,790,000	23.6	42,246,000	57.9	24,454,000	91	100	64	73	715,536	5,720,979
1879	1,681,000	24.0	40,283,000	58.9	23,714,000	86	92	75	80	1,128,923	7,135,258
1879	*1,998,000*	*22.0*	*43,997,000*								
1880	1,843,000	24.5	45,165,000	66.6	30,091,000	100	120	95	105	885,246	9,528,616
1881	1,968,000	20.9	41,161,000	82.3	33,863,000	101	107	100	100	205,930	12,182,722
1882	2,272,000	21.5	48,954,000	62.9	30,768,000	79	82	80	80	433,005	10,050,687
1883	2,379,000	21.1	50,136,000	58.7	29,420,000	62	67	65	74	724,955	8,596,122
1884	2,609,000	23.5	61,203,000	48.7	29,779,000	53	58	65	65	629,130	9,986,507
1885	2,729,000	21.4	58,360,000	56.3	32,868,000	62	65	58	60	252,183	10,197,115
1886	2,653,000	22.4	59,428,000	53.6	31,841,000	51	54	57	67	1,305,300	10,355,594
1887	2,902,000	19.6	56,812,000	51.9	29,464,000	80	80	69	77	550,884	10,831,461
1888	2,996,000	21.3	63,884,000	59.0	37,672,000					1,440,321	11,368,414
1889	3,221,000	24.3	78,333,000	41.6	32,614,000	58	58			1,408,311	11,332,545
1889	*3,221,000*	*24.3*	*78,333,000*								
1890	3,135,000	21.4	67,168,000	62.7	42,141,000					973,062	5,078,733
1891	3,353,000	25.9	86,839,000	52.4	45,470,000					2,800,075	3,146,328
1892	3,400,000	23.6	80,097,000	47.5	38,026,000	65	67	65	85	3,035,267	1,970,129
1893	3,220,000	21.7	69,869,000	41.1	28,729,000	52	54	55	60	5,219,405	791,061
1894	3,171,000	19.4	61,400,000	44.2	27,134,000	53½	55½	51	52	1,563,754	2,116,816
1895	3,300,000	26.4	87,073,000	33.7	29,312,000	33	40	25	36	7,680,331	837,384
1896	2,951,000	23.6	69,695,000	32.3	22,491,000	22	37	24½	35	20,030,301	1,271,787
1897	2,719,000	24.5	66,685,000	37.7	25,142,000	25½	42	36	53	11,237,077	124,804
1898	2,583,000	21.6	55,792,000	41.3	23,064,000	40	50½	36	42	2,267,403	110,475
1899	2,878,000	25.5	73,382,000	40.3	29,594,000	35	45	36	44	23,661,662	189,757
1899	*4,470,000*	*26.8*	*119,635,000*								
1900	2,894,000	20.4	58,926,000	40.9	24,075,000	37	61	37	57	6,293,207	171,004
1901	4,296,000	25.6	109,933,000	45.2	49,705,000	56	63	64	72	8,714,268	57,406
1902	4,661,000	29.0	134,954,000	45.9	61,899,000	35	70	48	56	8,429,141	55,462
1903	4,993,000	26.4	131,861,000	45.6	60,166,000	42	61½	38	59	10,881,627	90,708
1904	5,146,000	27.2	139,749,000	42.0	58,652,000	38	52	40	50	10,661,655	81,020
1905	5,096,000	26.8	136,551,000	40.5	54,993,000	37	53	42	55½	17,729,360	18,049
1906	6,324,000	28.3	178,916,000	41.5	74,236,000	44	56	66	85	8,238,842	88,319
1907	6,448,000	23.8	153,597,000	66.6	102,290,000	78	102	60	75	4,349,078	199,741
1908	6,646,000	25.1	166,756,000	55.4	92,442,000	57	64½	66	75	6,590,393	2,644
1909	7,011,000	24.3	170,284,000								
1909	*7,698,000*	*22.5*	*173,321,000*	54.0	93,526,000	55	72	50	68	4,311,566	
1910[2]	7,743,000	22.5	173,832,000	57.8	100,426,000	72	90	75	115	9,399,346	
1911	7,627,000	21.0	160,240,000	86.9	139,182,000	102	130	68	132	1,585,242	
1912	7,530,000	29.7	223,824,000	50.5	112,957,000	43	77	45	68	17,536,703	
1913	7,499,000	23.8	178,189,000	53.7	95,731,000	50	79	51	66	6,644,747	
1914	7,565,000	25.8	194,953,000	54.3	105,903,000	60	75				

[1] Prices 1895 to 1908 for No. 3 grade. [2] Figures adjusted to census basis.

BARLEY—Continued.

TABLE 41.—*Barley: Acreage, production, and total farm value, by States, 1914.*

[000 omitted.]

States.	Acreage.	Production.	Farm value, Dec. 1.	States.	Acreage.	Production.	Farm value, Dec. 1.
	Acres.	*Bushels.*	*Dollars.*		*Acres.*	*Bushels.*	*Dollars.*
Maine	5	150	122	Kansas	240	5,880	2,764
New Hampshire	1	32	26	Kentucky	5	142	109
Vermont	12	414	310	Tennessee	5	135	111
New York	75	2,100	1,491	Texas	8	200	140
Pennsylvania	7	196	137	Oklahoma	7	175	93
Maryland	5	165	109	Montana	70	2,135	1,132
Virginia	11	286	229	Wyoming	16	528	338
Ohio	35	875	516	Colorado	103	3,966	2,181
Indiana	8	200	134	New Mexico	5	170	128
Illinois	55	1,622	989	Arizona	35	1,260	756
Michigan	90	2,340	1,521	Utah	32	1,440	720
Wisconsin	675	18,428	11,425	Nevada	13	611	397
Minnesota	1,378	31,694	16,798	Idaho	185	7,030	3,515
Iowa	360	9,360	5,148	Washington	182	7,098	3,691
Missouri	5	120	78	Oregon	122	3,660	2,233
North Dakota	1,450	28,275	12,724	California	1,402	42,060	24,815
South Dakota	850	19,550	9,775				
Nebraska	113	2,656	1,248	United States	7,565	194,953	105,903

TABLE 42.—*Barley: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels). 10-year average, 1905–1914.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	Farm price per bushel (cents). 10-year average, 1905–1914.	1910	1911	1912	1913	1914	Value per acre (dollars).[1] 5-year average 1910–1914.	1914
Me.	28.8	29.0	31.5	28.0	28.0	26.5	31.0	28.0	26.2	28.0	30.0	77	76	90	77	80	81	23.13	24.30
N. H.	25.3	20.8	21.4	24.0	24.0	25.0	26.0	24.0	28.0	28.0	32.0	79	77	86	84	80	82	22.56	26.24
Vt.	31.9	31.5	32.8	28.5	33.0	30.0	31.0	30.5	35.0	32.0	34.5	72	68	82	80	80	75	25.11	25.88
N. Y.	26.2	25.7	26.3	25.0	26.0	24.8	28.3	25.0	26.0	26.7	28.0	79	70	97	68	69	71	20.01	19.88
Pa.	25.6	25.0	25.0	25.5	26.0	21.8	26.5	25.0	27.5	26.0	28.0	65	63	65	68	71	70	17.94	19.60
Md.	30.0	31.0	31.0	33.0	30.0	32.0	31.0	23.0	27.0	29.0	33.0	60	61	80	68	64	66	18.28	21.78
Va.	27.1	28.0	28.6	29.0	28.0	28.5	29.3	23.0	25.0	26.0	26.0	65	67	70	75	70	80	18.70	20.80
Ohio	27.3	26.2	30.0	28.0	27.5	25.9	28.5	27.2	31.0	24.0	25.0	60	60	84	55	58	59	17.13	14.75
Ind.	25.7	28.0	29.4	20.5	23.0	23.5	27.0	26.5	29.5	25.0	25.0	60	56	75	60	50	67	16.39	16.75
Ill.	29.0	30.0	30.0	28.0	28.5	28.0	30.2	28.0	31.5	26.0	29.5	59	56	92	53	57	61	18.44	18.00
Mich.	25.2	27.0	26.1	22.0	25.5	24.7	26.0	24.0	26.0	24.8	26.0	62	58	86	65	60	65	16.88	16.90
Wis.	27.5	29.9	30.7	23.0	30.0	28.0	25.9	25.5	29.4	25.0	27.3	62	64	99	55	60	62	17.98	16.93
Minn.	24.1	27.0	28.0	22.5	25.0	23.6	21.0	19.0	28.2	24.0	23.0	53	60	96	41	48	53	13.22	12.19
Iowa	26.2	26.0	28.3	25.5	27.0	22.0	29.5	21.9	31.0	25.0	26.0	53	56	93	52	55	55	16.21	14.30
Mo.	23.6	23.0	24.2	23.0	23.0	25.0	27.0	20.0	24.8	22.0	24.0	61	60	75	66	60	65	15.27	15.60
N. Dak.	20.7	28.0	25.8	18.3	19.5	21.0	5.5	19.5	29.9	20.0	19.5	47	55	85	35	40	45	9.37	8.78
S. Dak.	21.8	30.0	29.0	23.0	26.5	19.5	18.2	5.4	26.0	17.5	23.0	50	57	88	42	46	50	9.12	11.50
Nebr.	21.3	27.5	28.0	20.8	23.5	22.0	18.5	11.0	22.0	16.0	23.5	44	45	60	42	49	47	8.61	11.04
Kans.	17.2	22.0	23.5	12.0	16.0	18.0	18.0	6.5	23.5	8.1	24.5	47	45	60	40	55	47	7.48	11.52
Ky.	25.8	24.0	26.0	25.0	25.0	24.0	24.0	28.7	26.0	26.6	28.5	70	65	79	75	78	77	20.09	21.94
Tenn.	24.3	21.6	23.0	20.0	25.0	24.0	23.0	28.0	26.0	25.0	27.0	74	80	90	80	70	82	20.81	22.14
Tex.	23.5	24.0	24.5	17.0	24.0	19.4	30.0	18.0	29.3	24.0	25.0	79	90	93	78	81	70	20.71	17.50
Okla.	21.4	26.0	29.8	18.7	23.0	23.0	30.0	10.0	20.0	9.0	25.0	54	54	61	50	80	53	10.55	13.25
Mont.	33.8	33.0	33.0	38.0	35.0	38.0	28.0	34.5	36.5	31.0	30.5	58	62	68	53	48	53	18.24	16.16
Wyo.	32.3	31.7	31.4	32.0	35.0	31.0	30.0	34.0	34.0	30.5	33.0	66	67	75	62	61	64	21.28	21.12
Colo.	35.4	33.0	41.0	40.0	33.0	36.0	32.0	29.0	39.0	32.5	38.5	59	60	69	50	56	55	19.62	21.18
N. Mex.	30.7	21.0	27.0	26.0	42.0	40.0	25.0	33.0	35.0	24.0	34.0	75	80	70	71	72	75	22.15	25.50
Ariz.	38.7	44.0	42.2	35.5	38.0	40.0	36.0	36.5	40.0	39.0	36.0	80	90	87	87	73	60	29.81	21.60
Utah	41.2	37.0	44.0	39.0	45.0	40.0	36.0	43.0	45.0	38.5	45.0	58	60	66	59	55	50	24.04	22.50
Nev.	38.8	34.0	36.8	40.0	30.0	38.0	40.0	40.0	41.0	41.0	47.0	77	70	81	87	90	65	32.70	30.55
Idaho	40.5	40.0	41.0	44.5	41.0	40.0	33.0	42.0	43.5	42.0	38.0	54	50	70	51	48	50	21.45	19.00
Wash.	37.6	40.0	36.5	40.5	30.5	39.5	29.0	37.0	43.0	40.5	39.0	56	57	68	53	52	52	21.16	20.28
Oreg.	33.5	31.0	26.0	42.0	29.0	31.5	31.5	34.0	36.0	35.0	30.0	58	62	65	55	55	61	19.89	18.30
Cal.	27.3	31.5	27.0	28.9	23.5	28.5	31.0	28.0	30.0	26.0	30.0	68	55	85	70	68	59	19.45	17.70
U. S.	25.1	26.8	28.3	23.8	25.1	24.3	22.5	21.0	29.7	23.8	25.8	56.2	57.8	86.9	50.5	53.7	54.3	14.60	14.00

[1] Based upon farm price Dec. 1.

BARLEY—Continued.

TABLE 43.—*Barley: Condition of crop, United States, on first of months named, 1893–1914.*

Year.	June.	July.	August.	When harvested.	Year.	June.	July.	August.	When harvested.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1893	88.3	88.8	84.6	83.8	1904	90.5	88.5	88.1	87.4
1894	82.2	76.8	69.8	71.5	1905	93.7	91.5	89.5	87.8
1895	90.3	91.9	87.2	87.6	1906	93.5	92.5	90.3	89.4
1896	98.0	88.1	82.9	83.1	1907	84.9	84.4	84.5	78.5
1897	87.4	88.5	87.5	86.4	1908	89.7	86.2	83.1	81.2
1898	78.8	85.7	79.3	79.2	1909	90.6	90.2	85.4	80.5
1899	91.4	92.0	93.6	86.7	1910	89.6	73.7	70.0	69.8
1900	86.2	76.3	71.6	70.7	1911	90.2	72.1	66.2	65.5
1901	91.0	91.3	86.9	83.8	1912	91.1	88.3	89.1	88.9
1902	93.6	93.7	90.2	86.7	1913	87.1	76.6	71.9	73.4
1903	91.5	86.8	83.4	82.1	1914	95.5	92.6	85.3	82.4

TABLE 44.—*Barley: Farm price per bushel on first of each month, by geographical divisions, 1913 and 1914.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Cen. States east of Miss. R.		N. Cen. States west of Miss. R.		South Central States.		Far Western States.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	52.2	49.9	71.2	71.0	67.0	68.7	58.2	52.2	44.4	40.8	75.0	71.0	60.6	63.8
Februaay	52.4	51.4	68.3	66.6	72.5	69.3	55.7	55.2	45.5	42.4	70.8	75.5	60.4	65.0
March	51.1	49.0	72.0	68.9	68.0	70.3	54.4	50.0	45.4	41.5	73.2	66.5	57.2	60.7
April	51.7	48.5	72.4	71.3	70.2	71.7	53.5	51.4	44.3	40.9	66.5	63.6	61.0	58.6
May	49.3	48.3	74.7	73.3	67.5	64.7	53.6	50.9	43.1	41.2	70.7	52.0	55.6	58.6
June	49.1	52.7	71.9	72.4	71.8	73.0	53.4	53.7	43.4	44.5	75.3	50.4	54.9	66.2
July	47.5	53.7	73.1	71.3	75.2	73.0	48.9	52.8	42.2	45.0	64.0	51.2	53.5	68.4
August	45.1	50.8	69.7	76.2	73.8	63.3	53.1	53.6	40.3	43.1	50.0	52.5	47.9	61.1
September	52.5	55.2	75.4	75.2	75.0	68.7	60.3	54.9	52.4	51.3	61.5	67.4	48.5	61.4
October	51.6	56.8	74.7	72.7	74.0	73.3	61.2	58.3	46.4	52.7	60.0	68.0	54.9	62.6
November	51.7	54.7	73.8	71.1	72.0	73.0	59.1	60.2	47.7	48.8	56.2	76.4	53.8	61.8
December	54.3	53.7	72.1	71.3	74.9	68.0	62.2	59.6	49.8	46.3	69.5	78.4	57.0	61.5
Average	51.5	53.5	72.9	71.8	72.6	69.7	58.4	55.7	47.1	47.7	62.5	66.1	54.7	62.4

BARLEY—Continued.

TABLE 45.—*Barley: Wholesale price per bushel, 1900–1914.*

Date.	Cincinnati.		Chicago.		Milwaukee.		Minneapolis.		San Francisco.	
	No. 3 spring.[1]		Low malting to fancy.		No. 3.		All grades.		Feed (per 100 lbs.).[2]	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Dolls.*	*Dolls.*
1900	44¼	66	34	67	33	56	32	59	0.67½	0.75
1901	58	70	38	66	36	62	25	62	.73¾	.85
1902	55	74	37	73	......	......	30	70	.80	1.32½
1903	55	71	36	62	35	60	32	68	.90	1.22½
1904	55	69	30	61	34	57	28	56	.95	1.15
1905	52	58	35	55	36	49	30	48	1.02½	1.35
1906	52	62	38	58	37	54	31	51	......	......
1907	54	113	45	110	44	108	40	108	1.12½	1.72½
1908	67	115	49	106	48	102	44	102	1.22½	1.57½
1909	64	84	50	82½	50	82½	40	79	1.35	1.70
1910	67	86	50	90	56	88	48	76½	.95	1.50
1911	88	125	70	139	72	129	58	120	1.10	1.98¾
1912	55	132	40	140	54	136	33	130	1.15	1.95
1913	54½	80	42	85	58	80	39	73	1.22½	1.50
1914.										
January	62	70	52	79	57	68	42	63	1.21¼	1.32½
February	62	70	53	76	60	63½	43	65	1.05	1.22½
March	60	68	50	72	57	62	42	63	1.07	1.17½
April	60	66	50	66	......	......	42	56	.97½	1.15
May	......	......	51	66	56	61	43	57	.95	1.05
June	......	......	40	67	53	62	41	58	.90	.97½
July	......	......	50	58	51½	56	40	53	1.00	1.01¼
August	......	......	51	82	62	82	44	76	.95	1.07½
September	......	......	60	81	65	80	41	72	1.05	1.20
October	73	80	55	78	65	76	41	68	.95	1.12½
November	73	80	62	80	66½	77	53	68	.95	1.22½
December	70	80	60	75	65	72	52	67	1.15	1.30
Year	60	80	49	82	51½	82	40	76	.90	1.32½

[1] Extra No. 3 spring to 1911.

[2] No. 1 brewing to 1902, and 1907.

BARLEY—Continued.

TABLE 46.—*Barley and malt: International trade, calendar years 1911–1913.*

[See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	Barley. 1911	Barley. 1912	Barley. 1913 (prelim.).	Malt. 1911	Malt. 1912	Malt. 1913 (prelim.).	Barley and malt in terms of barley. 1911	Barley and malt in terms of barley. 1912	Barley and malt in terms of barley. 1913 (prelim.)
	Bushels.	*Bushels.*	*Bushels.*	*Bushels*	*Bushels.*	*Bushels.*	*Bushels*	*Bushels.*	*Bushels.*
Argentina	223	656	1,871				223	656	1,871
Austria-Hungary	4,875	9,522	8,190	11,264	11,996	12,180	15,115	20,428	19,271
Belgium	3,539	4,737	2,612	289	231	218	3,802	4,946	2,811
British India	9,475	31,843	10,069				9,475	31,843	10,069
Bulgaria	3,461	819	[1] 819				3,461	819	819
Canada	1,274	4,788	13,906	19	24	3	1,292	4,810	13,909
Chile	920	476	427	33	19	23	950	494	449
China	588	655	738				588	655	738
Denmark	3,301	3,552	3,566	63	112	117	3,357	3,654	3,673
France	720	669	445	33	48	19	750	712	462
Germany	85	53	280	1,130	1,255	1,198	1,112	1,194	1,369
Netherlands	31,035	23,956	31,993	831	755	449	31,790	24,642	32,402
Roumania	21,824	11,036	16,651	2			21,826	11,036	16,651
Russia	197,596	126,927	180,220	172	198	198	197,752	127,107	180,400
United Kingdom	170	102	48	966	952	806	1,049	967	781
United States	3,555	8,195	12,782	95	150	487	3,642	8,332	13,225
Other countries	17,267	13,456	12,975	9	6	8	17,275	13,460	12,978
Total	299,908	241,442	297,592	14,905	15,745	15,715	313,458	255,755	311,878

IMPORTS.

Country.	Barley. 1911	Barley. 1912	Barley. 1913 (prelim.).	Malt. 1911	Malt. 1912	Malt. 1913 (prelim.).	Barley and malt in terms of barley. 1911	Barley and malt in terms of barley. 1912	Barley and malt in terms of barley. 1913 (prelim.)
Argentina	3	3	4	1,269	1,441	1,597	1,157	1,316	1,456
Austria-Hungary	1,831	331	351	2		2	1,833	331	353
Belgium	19,471	21,830	17,336	868	674	734	20,260	22,443	18,004
Brazil	1	2	1	797	1,062	1,364	725	967	1,241
British South Africa	1	2	2	407	395	348	372	361	319
Canada	54	7	38	24	58	358	76	59	363
Cuba	234	328	273				234	328	273
Denmark	3,613	578	1,933	73	55	58	3,679	628	1,986
Egypt	318	415	1,338	67	54	534	436	464	1,824
France	9,360	6,290	5,326	322	103	111	9,653	6,384	5,428
Finland	287	254	392	165	267	278	437	497	645
Germany	167,006	136,383	148,728	2,886	2,948	3,532	169,630	139,063	151,939
Italy	840	878	728				840	878	728
Netherlands	41,407	30,747	40,783	3,883	3,612	4,183	44,937	34,030	44,585
Norway	5,039	3,763	3,892	114	108	157	5,142	3,862	4,035
Russia	924	791	261	31	23	23	952	812	282
Switzerland	1,114	1,126	1,190	3,767	3,810	3,302	4,538	4,590	4,192
United Kingdom	56,679	45,899	52,331	76	79	146	56,748	45,970	52,464
Other countries	1,353	2,680	1,864	439	570	582	1,749	3,198	2,391
Total	309,592	252,307	276,771	15,186	15,262	17,309	323,398	266,181	292,506

RYE.

TABLE 47.—*Rye: Area and production undermentioned of countries, 1912–1914.*

Country.	Area			Production.		
	1912	1913	1914	1912	1913	1914
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	2,117,000	2,557,000	2,541,000	35,664,000	41,381,000	42,779,000
Canada:						
Quebec	11,000	10,000	9,000	173,000	156,000	156,000
Ontario	93,000	85,000	78,000	1,711,000	1,567,000	1,341,000
Manitoba	5,000	5,000	5,000	105,000	103,000	100,000
Saskatchewan	3,000	3,000	3,000	57,000	68,000	54,000
Alberta	15,000	16,000	16,000	377,000	398,000	360,000
Other	(1)	(1)	(1)	5,000	8,000	6,000
Total Canada	127,000	119,000	111,000	2,428,000	2,300,000	2,017,000
Mexico	(2)	(2)	(2)	70,000	70,000	70,000
Total	.....	.....	.....	38,162,000	43,751,000	44,866,000
SOUTH AMERICA.						
Argentina	38,000	99,000	227,000	482,000	1,417,000	3,346,000
Chile	6,000	7,000	(1)	140,000	147,000	140,000
Uruguay	(1)	(1)	(1)	1,000	2,000	1,000
Total	.....	.....	.....	623,000	1,566,000	3,487,000
EUROPE.						
Austria-Hungary:						
Austria	5,021,000	4,852,000	(2)	119,620,000	109,093,000	95,000,000
Hungary	2,660,000	2,668,000	2,761,000	49,000,000	52,256,000	47,703,000
Croatia-Slavonia	188,000	167,000	(2)	1,350,000	2,553,000	2,000,000
Bosnia-Herzegovina	41,000	65,000	(2)	450,000	627,000	500,000
Total Austria-Hungary	7,910,000	7,752,000	.....	170,420,000	164,529,000	145,203,000
Belgium	650,000	641,000	645,000	21,312,000	22,463,000	21,000,000
Bulgaria	529,000	457,000	(2)	8,422,000	10,826,000	9,842,000
Denmark	607,000	(2)	(2)	16,083,000	16,637,000	17,000,000
Finland	(2)	(2)	(2)	12,344,000	10,289,000	10,806,000
France	2,969,000	2,905,000	2,914,000	48,890,000	49,452,000	50,000,000
Germany	15,489,000	15,849,000	16,057,000	456,600,000	481,169,000	440,000,000
Italy	305,000	307,000	304,000	5,285,000	5,589,000	5,260,000
Netherlands	564,000	562,000	560,000	16,094,000	16,895,000	14,635,000
Norway	(3)37,000	(2)	(2)	1,041,000	973,000	1,046,000
Roumania	265,000	224,000	208,000	3,583,000	3,711,000	1,959,000
Russia:						
Russia proper	65,043,000	.....	.....	908,410,000	.....	.....
Poland	5,228,000	.....	.....	95,014,000	.....	.....
Northern Caucasia	524,000	.....	.....	7,562,000	.....	.....
Total Russia (European)	70,795,000	71,878,000	71,636,000	1,010,986,000	962,362,000	870,000,000
Servia	123,000	74,000	(2)	1,748,000	937,000	1,000,000
Spain	1,944,000	1,917,000	1,887,000	18,867,000	27,916,000	23,950,000
Sweden	989,000	(2)	(2)	23,323,000	22,266,000	27,599,000
United Kingdom	68,000	64,000	67,000	1,500,000	1,750,000	1,800,000
Total	.....	.....	.....	1,816,498,000	1,797,764,000	1,641,100,000
ASIA.						
Russia:						
Central Asia[4]	104,000	.....	(2)	1,117,000	.....	.....
Siberia[4]	2,279,000	.....	(2)	29,955,000	.....	.....
Transcaucasia[5]	2,000	.....	(2)	14,000	.....	.....
Total Russia (Asiatic)	2,385,000	(6)3,112,000	(2)	31,086,000	(6)30,706,000	(6)39,982,000
AUSTRALASIA.						
Australia:						
Queensland	.....	.....	(2)	.....	2,000	(2)
New South Wales	2,000	3,000	(2)	26,000	42,000	(2)
Victoria	1,000	1,000	(2)	10,000	18,000	(2)
South Australia	1,000	1,000	(2)	7,000	10,000	(2)
Western Australia	1,000	1,000	(2)	3,000	4,000	(2)
Tasmania	1,000	1,000	(2)	12,000	20,000	(2)
Total Australia	6,000	7,000	(2)	58,000	96,000	100,000
New Zealand	6,000	(2)	(2)	90,000	90,000	90,000
Total Australasia	12,000	.....	(2)	148,000	186,000	190,000
Grand total	.....	.....	.....	1,886,517,000	1,873,973,000	1,729,625,000

[1] Less than 500 acres.
[2] No official statistics.
[3] Area in 1907 (census).
[4] Four governments.
[5] One government.
[6] Ten governments.

RYE—Continued.

Table 48.—*Rye: Total production of countries mentioned in Table 47, 1895–1914.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1895	1,468,212,000	1900	1,557,634,000	1905	1,495,751,000	1910	1,673,473,000
1896	1,499,250,000	1901	1,416,022,000	1906	1,433,395,000	1911	1,573,933,000
1897	1,300,645,000	1902	1,647,845,000	1907	1,538,778,000	1912	1,886,517,000
1898	1,461,171,000	1903	1,659,961,000	1908	1,590,057,000	1913	1,873,973,000
1899	1,583,179,000	1904	1,742,112,000	1909	1,747,123,000	1914	1,729,625,000

Table 49.—*Rye: Average yield per acre of undermentioned countries, 1890–1913.*

Year.	United States.	Russia (European).[1]	Germany.[1]	Austria.[1]	Hungary proper.[1]	France.[2]	Ireland.[1]
Average:	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1890–1899	13.9	10.4	20.9	16.1	. . .	17.6	25.2
1900–1909	15.7	11.5	25.6	19.0	17.6	17.1	27.5
1904	15.2	13.7	26.3	19.3	17.0	16.6	26.0
1905	16.5	10.1	24.9	20.2	19.4	18.5	27.0
1906	16.7	8.8	25.1	19.9	19.8	16.3	27.6
1907	16.4	10.8	25.8	18.9	16.0	18.2	27.0
1908	16.4	11.0	28.0	22.0	17.5	16.8	29.2
1909	13.4	12.6	28.8	22.3	17.8	18.1	30.8
1910	16.0	12.3	27.1	21.3	18.9	14.7	30.3
1911	15.6	10.5	28.2	20.9	18.7	15.8	29.0
1912	16.8	14.3	29.5	23.3	19.4	16.5	30.6
1913	16.2	([3]) 13.4	30.4	22.0	19.5	17.0	30.0
Average (1904–1913)	15.9	11.8	27.4	21.0	18.4	16.8	28.5

[1] Bushels of 56 pounds. [2] Winchester bushels. [3] Includes 10 governments of Asiatic Russia.

RYE—Continued.

Table 50.—*Rye: Acreage, production, value, exports, etc., in the United States, 1849–1914.*

Note.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage harvested.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, No. 2. December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports including rye flour, fiscal year beginning July 1.
	Acres.	*Bush.*	*Bushels.*	*Cents.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*
1849			*14,189,000*							
1859			*21,101,000*							
1866	1,548,000	13.5	20,865,000	82.2	17,150,000			142	150	234,971
1867	1,689,000	13.7	23,184,000	100.4	23,281,000	132	157	173	185	564,901
1868	1,651,000	13.6	22,505,000	94.9	21,349,000	106½	118	100	115½	92,865
1869	1,658,000	13.6	22,528,000	77.0	17,342,000	66	77½	78	83½	199,450
1869			*16,919,000*							
1870	1,176,000	13.2	15,474,000	73.2	11,327,000	67	74	81	91	87,174
1871	1,070,000	14.4	15,366,000	71.1	10,928,000	62	63¾	75	93	832,689
1872	1,049,000	14.2	14,889,000	67.6	10,071,000	57½	70	68½	70	611,749
1873	1,150,000	13.2	15,142,000	70.3	10,638,000	70	81	91	102	1,923,404
1874	1,117,000	13.4	14,991,000	77.4	11,610,000	93	99½	103	107½	267,058
1875	1,360,000	13.0	17,722,000	67.1	11,894,000	67	68¾	61½	70½	589,159
1876	1,468,000	13.9	20,375,000	61.4	12,505,000	65¼	73	70	92½	2,234,856
1877	1,413,000	15.0	21,170,000	57.6	12,202,000	55½	56½	54	60	4,249,684
1878	*1,623,000*	*15.9*	*25,843,000*	*52.5*	*13,566,000*	*44*	*44½*	*47*	*52*	*4,877,821*
1879	1,625,000	14.5	23,639,000	65.6	15,507,000	73½	81	73½	85	2,943,894
1879	*1,842,000*	*10.8*	*19,832,000*							
1880	1,768,000	13.9	24,541,000	75.6	18,565,000	82	91½	115	118	1,955,155
1881	1,789,000	11.6	20,705,000	93.3	19,327,000	96½	98	77	83	1,003,609
1882	2,228,000	13.4	29,960,000	61.5	18,439,000	57	58½	62	67	2,206,212
1883	2,315,000	12.1	28,059,000	58.1	16,301,000	56½	60	60½	62½	6,247,590
1884	2,344,000	12.2	28,640,000	51.9	14,857,000	51	52	68	73	2,974,390
1885	2,129,000	10.2	21,756,000	57.9	12,595,000	58½	61	58	61	216,699
1886	2,130,000	11.5	24,489,000	53.8	13,181,000	53	54½	54½	56¼	377,302
1887	2,053,000	10.1	20,693,000	54.5	11,283,000	55¼	61½	63	68	94,827
1888	*2,365,000*	*12.0*	*28,415,000*	*58.8*	*16,722,000*	*50*	*52*	*39*	*41½*	*309,266*
1889	2,171,000	13.1	28,420,000	42.3	12,010,000	44	45½	49½	54	2,280,975
1889	*2,172,000*	*13.1*	*28,421,000*							
1890	2,142,000	12.0	25,807,000	62.9	16,230,000	64½	68½	83	92	358,263
1891	2,176,000	14.6	31,752,000	77.4	24,589,000	86	92	70¼	79	12,068,628
1892	2,164,000	12.9	27,979,000	54.2	15,160,000	46	51	50¼	62	1,493,924
1893	2,038,000	13.0	26,555,000	51.3	13,612,000	45	47½	44½	48	249,152
1894	1,945,000	13.7	26,728,000	50.1	13,395,000	47½	49	62½	67	32,045
1895	1,890,000	14.4	27,210,000	44.0	11,965,000	32	35¼	33	36¼	1,011,128
1896	1,831,000	13.3	24,369,000	40.9	9,961,000	37	42½	32¾	35¼	8,575,663
1897	1,704,000	16.1	27,363,000	44.7	12,240,000	45¾	47	45	75	15,562,035
1898	*1,643,000*	*15.6*	*25,658,000*	*46.3*	*11,875,000*	*52½*	*55½*	*56½*	*62*	*10,169,822*
1899	1,659,000	14.4	23,962,000	51.0	12,214,000	49	52	53	56½	2,382,012
1899	*2,054,000*	*12.4*	*25,569,000*							
1900	1,591,000	15.1	23,996,000	51.2	12,295,000	45¾	49¾	51½	54	2,345,512
1901	1,988,000	15.3	30,345,000	55.7	16,910,000	59	65¼	54½	58	2,712,077
1902	1,979,000	17.0	33,631,000	50.8	17,081,000	48	49¼	48	50¼	5,445,273
1903	1,907,000	15.4	29,363,000	54.5	15,994,000	50¼	52½	69¼	78	784,068
1904	1,793,000	15.2	27,242,000	68.8	18,748,000	73	75	70	84	29,749
1905	1,730,000	16.5	28,486,000	61.1	17,414,000	64	68	58	62	1,387,826
1906	2,002,000	16.7	33,375,000	58.9	19,671,000	61	65	69	87½	769,717
1907	1,926,000	16.4	31,566,000	73.1	23,068,000	75	82	79	88	2,444,588
1908	*1,948,000*	*16.4*	*31,851,000*	*73.6*	*23,455,000*	*75*	*77½*	*83*	*90*	*1,295,701*
1909	2,006,000	16.1	32,239,000							
1909	*2,196,000*	*13.4*	*29,520,000*	71.8	21,164,000	72	80	74	80	242,262
1910[1]	2,185,000	16.0	34,897,000	71.5	24,953,000	80	82	90	113	40,123
1911	2,127,000	15.6	33,119,000	83.2	27,557,000	91	94	90	95½	31,384
1912	2,117,000	16.8	35,664,000	66.3	23,636,000	58	64	60	64	1,854,738
1913	2,557,000	16.2	41,381,000	63.4	26,220,000	61	65	62	67	2,272,492
1914	2,541,000	16.8	42,779,000	86.5	37,018,000	107¼	112½			

[1] Figures adjusted to census basis.

RYE—Continued.

Table 51.—*Rye: Acreage, production, and total farm value, by States, 1914.*

[000 omitted.]

State.	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Bush.*	*Dollars.*
Vermont	1	20	16
Massachusetts	3	57	58
Connecticut	7	133	130
New York	129	2,283	2,032
New Jersey	70	1,295	1,062
Pennsylvania	280	5,040	4,183
Delaware	1	18	17
Maryland	25	425	366
Virginia	58	754	679
West Virginia	17	240	221
North Carolina	46	460	483
South Carolina	3	34	51
Georgia	13	121	182
Ohio	95	1,615	1,308
Indiana	99	1,614	1,372
Illinois	49	784	666
Michigan	371	5,936	5,402
Wisconsin	412	6,798	6,186
Minnesota	279	5,245	4,068
Iowa	59	1,121	863
Missouri	17	238	207
North Dakota	131	2,240	1,882
South Dakota	60	1,020	796
Nebraska	122	1,952	1,444
Kansas	50	1,000	800
Kentucky	22	301	286
Tennessee	22	286	280
Alabama	2	26	29
Texas	2	30	30
Oklahoma	6	96	91
Arkansas	1	10	10
Montana	10	210	147
Wyoming	5	85	69
Colorado	21	398	239
Utah	13	228	137
Idaho	3	60	40
Washington	8	158	134
Oregon	21	336	336
California	8	136	116
United States	2,541	42,779	37,018

Table 52.—*Rye: Condition of crop, United States, on first of months named, 1890–1915.*

Year.	December of previous year.	April.	May.	June.	When harvested.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1890	96.4	92.8	93.5	92.3	92.0
1891	99.0	95.4	97.2	95.4	93.9
1892	88.8	87.0	88.9	91.0	92.8
1893	89.4	85.7	82.7	84.6	85.3
1894	94.6	94.4	90.7	93.2	87.0
1895	96.2	87.0	88.7	85.7	80.7
1896	88.1	82.9	87.7	85.2	88.4
1897	99.8	88.9	88.0	89.9	93.4
1898	91.0	92.1	94.5	97.1	94.6
1899	98.9	84.9	85.2	84.5	85.6
1900	98.2	84.8	88.5	87.6	80.4
1901	99.1	93.1	94.6	93.9	93.0
1902	89.9	85.4	83.4	88.1	90.2
1903	98.1	97.9	93.3	90.6	89.5
1904	92.7	82.3	81.2	86.3	88.9
1905	90.5	92.1	93.5	94.0	93.2
1906	95.4	90.9	92.9	89.9	91.3
1907	96.2	92.0	88.0	88.1	89.7
1908	91.4	89.1	90.3	91.3	91.2
1909	87.6	87.2	88.1	89.6	91.4
1910	94.1	92.3	91.3	90.6	87.5
1911	92.6	89.3	90.0	88.6	85.0
1912	93.3	87.9	87.5	87.7	88.2
1913	93.5	89.3	91.0	90.9	88.6
1914	95.3	91.3	93.4	93.6	92.9
1915	93.6	89.5	......	......	......

RYE—Continued.

TABLE 53.—*Rye: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1905-1914.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	10-year average, 1905-1914.	1910	1911	1912	1913	1914	5-year average, 1910-1914	1914
Vt.	17.8	15.0	17.4	17.0	15.0	15.5	17.5	22.5	20.0	18.0	20.0	84	85	95	90	90	80	17.29	16.00
Mass.	16.9	15.5	15.0	16.5	16.5	16.2	17.0	16.0	18.5	18.5	19.0	92	94	95	100	98	101	17.40	19.19
Conn.	18.4	18.0	18.0	17.0	18.5	18.7	20.0	18.5	17.5	19.3	19.0	86	86	93	92	92	98	17.38	18.62
N. Y.	17.0	16.0	17.6	16.5	16.5	17.0	18.3	16.7	16.5	17.2	17.7	78	74	89	76	75	89	13.92	15.75
N. J.	17.4	18.0	17.2	17.5	16.2	16.3	18.0	16.4	17.5	18.0	18.5	76	77	83	79	80	82	14.17	15.17
Pa.	16.8	17.0	17.4	16.7	16.5	15.3	17.0	15.1	17.5	17.5	18.0	75	73	80	77	74	83	13.17	14.94
Del.	14.7	10.0	15.0	16.5	15.5	14.0	15.5	15.0	14.0	14.0	17.5	78	69	95	81	79	92	12.69	16.10
Md.	15.2	14.5	14.7	16.0	15.0	14.1	16.1	14.5	15.5	14.4	17.0	76	75	86	80	76	86	12.50	14.62
Va.	12.7	11.8	13.4	14.0	12.5	12.3	13.5	11.5	12.5	12.3	13.0	81	80	89	85	81	90	10.66	11.70
W. Va.	12.7	11.8	12.2	12.0	13.0	13.5	12.9	11.0	13.0	13.5	14.5	84	90	90	84	87	90	11.44	13.05
N. C.	9.9	9.5	11.0	10.5	8.9	9.4	10.0	10.0	9.3	10.3	10.0	98	101	100	105	98	105	10.09	10.50
S. C.	9.8	8.1	8.5	10.0	9.6	9.8	10.0	10.0	9.5	10.5	11.5	138	146	145	145	150	150	15.18	17.25
Ga.	9.1	7.7	8.3	9.0	8.7	9.0	10.4	9.5	9.2	9.5	9.3	132	140	138	140	135	150	13.46	13.95
Ohio.	16.9	18.0	19.5	17.2	16.5	17.2	16.5	15.5	15.5	16.5	17.0	73	72	85	75	69	81	12.37	13.77
Ind.	15.6	15.4	17.0	17.0	15.0	16.5	15.8	13.7	14.5	15.2	16.3	70	68	80	68	62	85	10.07	13.86
Ill.	17.1	18.0	17.0	18.5	17.1	17.8	17.4	16.8	16.0	16.5	16.0	71	71	81	70	66	85	12.30	13.60
Mich.	15.0	16.0	14.5	14.5	15.5	15.5	15.3	14.6	13.3	14.3	16.0	70	68	85	65	62	91	10.98	14.56
Wis.	17.2	16.5	17.0	18.0	19.0	16.3	16.0	17.0	18.3	17.5	16.5	69	71	84	61	57	91	12.36	15.02
Minn.	19.0	18.2	19.3	18.5	18.5	19.0	17.0	18.7	23.0	19.0	18.8	62	64	78	50	48	89	12.56	16.73
Iowa.	18.4	17.5	18.6	17.8	20.0	17.8	18.5	18.0	19.0	18.2	19.0	63	64	77	62	60	77	12.61	14.63
Mo.	14.7	15.5	15.8	15.4	12.8	15.0	15.0	14.1	14.8	15.0	14.0	75	75	84	80	75	87	11.67	12.18
N. Dak.	16.5	19.5	18.7	16.0	18.0	18.4	8.5	16.6	18.0	14.4	17.1	59	63	76	47	45	84	9.46	14.36
S. Dak.	16.6	19.0	18.8	17.0	17.5	17.5	17.0	10.0	19.5	13.2	17.0	59	61	76	52	50	78	9.59	13.26
Nebr.	16.4	18.0	21.0	17.0	16.0	16.5	16.0	13.0	16.0	14.5	16.0	60	60	75	56	60	74	9.77	11.84
Kans.	14.6	15.7	16.0	12.0	13.3	14.2	14.0	11.0	15.9	14.0	20.0	69	73	81	68	75	80	11.29	16.00
Ky.	13.4	15.0	15.2	13.7	13.5	12.7	13.0	12.0	13.0	12.4	13.7	85	85	94	88	87	95	11.52	13.02
Tenn.	11.8	12.1	13.0	10.0	12.5	10.7	11.0	11.9	11.5	12.0	13.0	91	92	99	98	99	98	11.56	12.74
Ala.	11.4	11.7	12.5	10.5	10.0	11.3	12.0	10.0	11.5	11.0	13.0	123	120	125	134	140	110	14.40	14.30
Tex.	13.3	14.0	14.6	10.0	15.5	11.2	11.5	10.0	16.6	15.0	14.8	101	103	107	110	101	99	14.12	14.66
Okla.	12.4	12.1	13.9	10.0	13.5	13.5	13.7	9.5	12.0	9.5	16.0	82	81	104	87	86	95	10.96	15.20
Ark.	10.9	12.0	12.0	9.9	10.0	10.5	12.0	10.0	10.5	11.5	10.5	96	98	90	105	95	105	10.74	11.02
Mont.	22.0	20.0	20.5	22.0	20.0	29.0	20.0	23.0	23.5	21.0	21.0	67	68	72	60	55	70	14.10	14.70
Wyo.	20.5	23.0	19.0	21.5	22.0	26.0	18.5	20.0	19.0	19.0	17.0	74	81	90	65	64	81	14.25	13.77
Colo.	17.7	19.0	20.0	20.5	15.5	22.0	14.0	12.0	19.5	17.0	17.5	63	67	70	55	60	65	10.02	11.38
Utah.	18.3	18.0	24.0	20.0	15.5	22.0	18.5	15.5	15.0	17.0	17.5	66	68	70	68	60	60	10.87	10.50
Idaho.	22.3	25.0	25.2	24.7	20.0	21.5	20.0	22.5	22.0	22.0	20.0	64	66	67	60	58	67	13.53	13.40
Wash.	20.3	18.5	19.6	21.5	19.5	21.0	20.5	22.0	20.0	21.0	19.7	78	89	80	65	60	85	15.64	16.74
Oreg.	16.7	15.0	17.2	16.0	18.0	17.0	15.1	19.5	16.0	17.5	16.0	86	100	90	70	75	100	14.59	16.00
Cal.	15.4	13.0	12.8	19.0	12.0	13.8	17.0	17.0	17.6	15.0	17.0	85	86	85	90	75	85	14.12	14.45
U. S.	16.4	16.5	16.7	16.4	16.4	16.1	16.0	15.6	16.8	16.2	16.8	71.2	71.5	83.2	66.3	63.4	86.5	12.07	14.57

[1] Based upon farm price Dec. 1.

RYE—Continued.

TABLE 54.—*Rye: Farm price per bushel on first of each month, by geographical divisions, 1913 and 1914.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	62.5	63.8	74.9	75.4	85.3	86.6	59.8	61.0	51.9	51.2	88.0	89.8	67.0	66.2
February	61.7	68.9	74.7	74.0	85.1	88.6	57.8	74.0	51.9	52.8	86.8	86.8	68.0	65.2
March	61.9	63.2	73.1	75.0	85.4	87.5	58.6	59.1	51.9	52.8	95.7	88.0	69.8	61.9
April	63.0	62.9	75.0	73.6	87.5	90.2	58.9	59.0	53.5	52.1	91.5	91.8	76.2	63.8
May	62.9	62.4	75.7	75.6	86.4	85.6	59.8	56.5	51.7	53.1	85.7	88.5	72.0	63.6
June	64.4	64.1	75.8	75.7	86.9	87.6	60.4	59.6	55.6	54.3	85.0	86.3	73.2	64.5
July	63.1	63.2	75.1	76.0	87.8	86.3	60.4	58.2	52.2	52.3	76.0	86.7	67.1	69.6
August	61.0	60.7	71.9	70.9	83.6	82.4	67.3	55.9	51.1	51.7	78.8	81.0	78.9	69.6
September	75.4	63.0	80.0	70.9	89.6	82.4	74.6	59.6	70.7	55.3	86.0	86.2	69.3	65.4
October	79.0	64.8	82.1	74.3	90.3	86.1	78.9	61.6	74.6	55.6	92.8	90.8	75.1	63.0
November	80.1	63.2	84.5	73.3	90.2	86.3	80.1	60.0	75.4	52.9	96.2	91.3	73.4	62.5
December	86.5	63.4	84.7	75.6	97.1	89.3	89.2	60.6	83.2	52.5	96.9	92.9	77.0	64.0
Average	71.6	63.7	78.8	73.9	88.3	85.9	70.0	60.6	67.3	53.5	88.1	88.0	72.0	64.7

TABLE 55.—*Rye: Wholesale price per bushel, 1900–1914.*

Date.	*Philadelphia.*		*Cincinnati.* No. 2.		*Chicago.* No. 2.		*Duluth.*		San Francisco (per 100 lbs.).	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Dolls.*	*Dolls.*
1900	......	......	51½	67	44½	60¼	46	60½	......	......
1901	58	71½	45	73	46¼	65¾	46½	62⅝	0.75	0.87½
1902	54	71	51	71½	48	67½	46	64	.77½	1.15
1903	56	68½	54	68	48	60	48	55¼	1.10	1.30
1904	65	96	61	87	51	81	54½	80	1.25	1.47½
1905	63	90½	56	87	57¼	84	55¼	78	1.40	1.75
1906	55½	67	58	72½	55½	68	53	61	......	......
1907	75	100	68	93	60	91½	57	86	1.35	1.52½
1908	80	95	78	89	72	87	60	80	1.35	1.52½
1909	75	95	70	92	67	91	62	88	1.55	2.05
1910	75	92	73	87	72	82	67	78½	1.50	2.00
1911	78	107	79	101	80	113	72	100	1.40	1.60
1912	68	105	62	100	58	96½	53	91½	1.40	1.72½
1913	65	77	60	72	58	70½	50	65	1.32½	1.63
1914.										
January	70	75	62	65	60	62	50	55½	1.60	1.65
February	70	75	63	67	61	64	52½	56½	1.55	1.65
March	69	74	64½	67	59½	63	53	57	1.55	1.65
April	68	70	64	67	60	63	54½	58	1.55	1.60
May	68	70	63	71	62	67	56½	61½	1.55	1.60
June	65	70	65	70	58	67	57	62	1.52½	1.60
July	65	70	60	75	55	72	57	64	1.30	1.55
August	70	85	73	98	67	101	65	95	1.40	1.55
September	85	95	90	99	90	100½	85	95	1.40	1.62½
October	98	108	90	94	88	96	84	94	1.57½	1.65
November	102	112	95	110	96	108	94	104	1.60	1.62½
December	112	125	109	115	107½	112½	102	107	1.60	1.67½
Year	65	125	60	115	55	112½	50	107	1.30	1.65

RYE—Continued.

TABLE 56.—*Rye (including flour): International trade, calendar years 1911–1913.*

[See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.)
	Bushels.	*Bushels.*	*Bushels.*		*Bushels.*	*Bushels.*	*Bushels.*
Argentina..........	22	445	861	Roumania..........	5,148	2,616	2,481
Belgium..........	*914*	*1,155*	*673*	Russia..............	45,234	26,359	33,051
Bulgaria..........	2,950	2,029	2,029	United States......	31	501	2,034
Canada............	80	1	127	Other countries....	476	582	549
Denmark..........	295	296	319				
Germany..........	*40,090*	*42,784*	*51,979*	*Total*.........	*115,137*	*93,191*	*114,394*
Netherlands........	19,897	16,423	20,291				

IMPORTS.

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.)
Austria-Hungary...	2,069	1,336	268	Norway............	11,305	9,168	11,027
Belgium..........	*6,791*	*5,309*	*6,372*	*Russia*............	*4,468*	*3,455*	*7,768*
Denmark..........	7,746	8,170	9,846	Sweden............	2,153	4,708	4,708
Finland...........	17,730	12,873	15,813	Switzerland........	776	750	661
France............	5,014	3,688	2,713	United Kingdom...	2,343	1,965	2,276
Germany..........	*24,253*	*12,501*	*13,846*	*Other countries*....	*429*	*713*	*737*
Italy..............	294	623	1,245				
Netherlands.......	33,083	27,714	32,273	Total.........	118,454	92,973	109,553

BUCKWHEAT.

TABLE 57.—*Buckwheat: Acreage, production, and value in the United States, 1849–1914.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage (thousands of acres).	Average yield per acre (bushels).	Production (thousands of bushels).	Average farm price Dec. 1 (cents per bushel).	Farm value Dec. 1 (thousands of dollars).	Year.	Acreage (thousands of acres).	Average yield per acre (bushels).	Production (thousands of bushels).	Average farm price Dec. 1 (cents per bushel).	Farm value Dec. 1 (thousands of dollars).
1849......	....	....	*8,957*	....	....	*1889*.....	*837*	*14.5*	*12,110*	....	....
1859......	....	....	*17,572*	....	....	1890.....	845	14.7	12,433	57.4	7,133
1866......	1,046	21.8	22,792	67.6	15,413	1891.....	849	15.0	12,761	57.0	7,272
1867......	1,228	17.4	21,359	78.7	16,812	1892.....	861	14.1	12,143	51.8	6,296
1868......	1,114	17.8	19,864	78.0	15,490	1893.....	816	14.9	12,132	58.3	7,074
1869......	1,029	16.9	17,431	71.9	12,535	1894.....	789	16.1	12,668	55.6	7,040
1869......	....	....	*9,822*	....	....	1895.....	763	20.1	15,341	45.2	6,936
1870......	*537*	*18.3*	*9,842*	*70.5*	*6,937*	*1896*.....	755	18.7	14,090	39.2	5,522
1871......	414	20.1	8,329	74.5	6,208	1897.....	718	20.9	14,997	42.1	6,319
1872......	448	18.1	8,134	73.5	5,979	1898.....	678	17.3	11,722	45.0	5,271
1873......	454	17.3	7,838	75.0	5,879	1899.....	670	16.6	11,094	55.7	6,184
1874......	*453*	*17.7*	*8,017*	72.9	5,844	*1899*.....	*807*	*13.9*	*11,234*	....	....
1875......	576	17.5	10,082	62.0	6,255	1900.....	638	15.0	9,567	55.8	5,341
1876......	666	14.5	9,669	66.6	6,436	1901.....	811	18.6	15,126	56.3	8,523
1877......	650	15.7	10,177	66.9	6,808	1902.....	805	18.1	14,530	59.6	8,655
1878......	*673*	18.2	*12,247*	*52.6*	*6,441*	*1903*.....	*804*	*17.7*	*14,244*	*60.7*	*8,651*
1879......	640	20.5	13,140	59.8	7,856	1904.....	794	18.9	15,008	62.2	9,331
1879......	*848*	*13.9*	*11,817*	....	....	1905.....	760	19.2	14,585	58.7	8,585
1880......	823	17.8	14,618	59.4	8,682	1906.....	789	18.6	14,642	59.6	8,727
1881......	829	11.4	9,486	86.5	8,206	1907.....	800	17.9	14,290	69.8	9,975
1882......	847	13.0	11,019	73.0	8,039	1908.....	803	19.8	15,874	75.6	12,004
1883......	857	8.9	7,669	82.2	6,304	1909.....	834	20.9	17,438	....	....
1884......	879	12.6	11,116	58.9	6,549	*1909*.....	*878*	*16.9*	*14,849*	70.1	10,346
1885......	914	13.8	12,626	55.9	7,057	1910 [1].....	860	20.5	17,598	66.1	11,636
1886......	918	12.9	11,869	54.5	6,465	1911.....	833	21.1	17,549	72.6	12,735
1887......	911	11.9	10,844	56.5	6,122	1912.....	841	22.9	19,249	66.1	12,720
1888......	913	13.2	12,050	63.3	7,628	1913.....	805	17.2	13,833	75.5	10,445
1889......	837	14.5	12,110	50.5	6,113	1914.....	792	21.3	16,881	76.4	12,892

[1] Figures adjusted to census basis.

BUCKWHEAT—Continued.

Table 58.—*Buckwheat: Acreage, production, and total farm value in the United States in 1914.*

[000 omitted.]

State.	Acreage.	Production.	Farm value Dec. 1.	State.	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Bush.*	*Dolls.*		*Acres.*	*Bush.*	*Dolls.*
Maine	12	348	209	Ohio	18	432	328
New Hampshire	1	25	18	Indiana	5	88	69
Vermont	8	224	184	Illinois	4	71	67
Massachusetts	2	37	31	Michigan	57	1,064	748
Connecticut	3	56	53	Wisconsin	17	288	226
New York	274	6,302	4,790	Minnesota	6	102	71
New Jersey	10	210	174	Iowa	6	110	85
Pennsylvania	280	5,740	4,362	Missouri	2	31	29
Delaware	3	57	43	Nebraska	1	18	15
Maryland	11	204	165	Kansas	1	16	14
Virginia	23	446	375	Tennessee	3	67	52
West Virginia	36	774	642				
North Carolina	9	171	142	United States	792	16,881	12,892

Table 59.—*Buckwheat: Condition of crop, United States, on first of months named, 1894-1914.*

Year.	Aug.	Sept.	When harvested.	Year.	Aug.	Sept.	When harvested.	Year.	Aug.	Sept.	When harvested.
	P. ct.	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*
1894	82.3	69.2	72.0	1901	91.1	90.9	90.5	1908	89.4	87.8	81.6
1895	85.2	87.5	84.8	1902	91.4	86.1	80.5	1909	86.4	83.0	78.5
1896	96.0	93.2	86.0	1903	93.9	91.0	83.0	1910	87.9	82.3	81.7
1897	94.9	95.1	90.8	1904	92.8	91.5	88.7	1911	82.9	83.8	81.4
1898	87.2	88.8	76.2	1905	92.6	91.8	91.6	1912	88.4	91.6	89.2
1899	93.2	75.2	70.2	1906	93.2	91.2	84.9	1913	85.5	75.4	65.9
1900	87.9	80.5	72.8	1907	91.9	77.4	80.1	1914	88.8	87.1	83.3

BUCKWHEAT—Continued.

TABLE 60.—*Buckwheat: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1905–1914.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	10-year average, 1905–1914.	1910	1911	1912	1913	1914	5-year average, 1910–1914.	1914
Me.	29.7	30.0	28.0	28.0	30.0	28.0	32.5	30.0	29.4	32.0	29.0	66	68	70	70	56	60	19.80	17.40
N. H.	25.6	23.0	22.0	22.0	21.5	22.0	31.0	27.3	31.0	31.0	25.0	73	62	81	72	66	70	20.32	17.50
Vt.	23.7	19.0	21.0	22.0	22.0	22.0	24.0	24.3	30.0	25.0	28.0	71	70	85	72	80	82	20.40	22.96
Mass.	19.8	20.0	20.0	21.0	18.0	19.3	22.0	21.0	21.0	17.0	18.5	79	85	89	85	80	84	16.88	15.54
Conn.	18.1	16.0	17.0	16.0	18.2	19.5	19.5	19.0	20.5	17.0	18.5	86	83	95	88	95	95	17.20	17.58
N. Y.	20.6	19.0	19.0	17.5	21.4	24.0	23.0	21.3	23.8	14.3	23.0	69	65	73	64	81	76	14.96	17.48
N. J.	20.4	21.0	18.0	16.5	20.0	21.8	21.5	20.0	22.0	22.0	21.0	72	69	75	72	76	83	15.97	17.43
Pa.	20.0	20.0	19.0	18.0	19.2	19.5	19.5	21.9	24.2	18.5	20.5	67	62	69	64	73	76	14.35	15.58
Del.	19.9	17.0	17.0	24.0	30.0	19.8	20.5	19.0	16.0	17.0	19.0	66	65	65	66	69	76	12.48	14.44
Md.	18.2	19.0	18.0	19.0	18.5	16.6	18.5	20.0	17.5	16.5	18.5	70	66	67	71	75	81	13.48	14.98
Va.	19.0	18.0	19.0	19.0	18.0	18.0	18.0	16.0	21.5	23.1	19.4	73	77	70	75	80	84	15.19	16.30
W. Va.	21.0	19.0	18.0	18.5	18.0	22.7	23.0	24.0	24.0	21.0	21.5	76	77	85	75	78	83	18.07	17.84
N. C.	17.4	15.0	14.0	15.5	16.4	19.8	19.0	19.0	17.5	19.3	19.0	76	80	80	85	78	83	15.22	15.77
Ohio	19.6	17.0	10.0	19.5	18.5	21.2	18.0	21.0	19.5	18.0	24.0	73	75	78	70	76	76	15.09	18.24
Ind.	17.4	17.0	16.0	15.5	17.0	17.3	17.7	18.3	19.0	18.5	17.5	73	70	74	73	75	78	13.47	13.65
Ill.	18.3	16.0	19.0	17.0	18.2	18.2	20.0	18.1	22.0	17.0	17.7	83	90	95	80	80	95	16.64	16.82
Mich.	15.6	16.0	13.0	15.5	13.5	14.3	15.3	18.0	17.0	15.0	18.5	65	62	71	65	70	71	11.39	13.14
Wis.	15.6	15.0	15.0	16.0	15.2	12.3	14.0	17.5	17.0	16.5	17.5	70	75	75	66	69	76	11.90	13.30
Minn.	16.5	14.0	14.0	14.7	18.2	15.2	16.0	18.0	21.0	16.5	17.0	68	72	76	65	64	70	12.26	11.90
Iowa	15.4	13.0	12.0	15.0	15.5	15.0	14.9	17.5	19.0	14.0	18.3	80	83	90	75	81	77	13.56	14.09
Mo.	15.9	16.0	18.0	16.0	20.1	21.0	16.5	10.0	15.0	11.0	15.5	89	87	105	95	85	93	12.58	14.42
Nebr.	17.0	14.0	15.0	14.5	18.0	16.0	20.0	16.0	18.0	20.0	18.5	82	90	95	90	79	84	16.15	15.54
Kans.	14.2	11.0	17.0	12.0	18.7	14.0	15.0	12.0	16.0	10.0	16.0	85	90	98	78	80	90	12.03	14.40
Tenn.	16.4	16.0	16.0	15.0	15.3	15.0	15.0	16.0	18.0	15.0	22.3	79	80	79	78	75	78	13.64	17.39
U. S.	19.9	19.2	18.6	17.9	19.8	20.9	20.5	21.1	22.9	17.2	21.3	69.0	66.1	72.6	66.1	75.5	76.4	14.64	16.28

[1] Based upon farm price Dec. 1.

TABLE 61.—*Buckwheat: Farm price per bushel on first of each month, by geographical divisions, 1913 and 1914.*

Month.	United States		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	76.6	66.8	76.1	65.0	80.0	76.2	75.5	68.8	78.5	90.0	75.0	72.0
February	75.6	69.4	74.4	68.0	83.4	79.3	75.1	69.4	71.0	85.0	80.0	75.0
March	75.1	67.0	74.5	65.9	80.3	75.7	73.4	66.6	73.0	67.5	75.0	70.0
April	76.9	68.3	76.4	67.5	83.8	77.9	73.7	66.4	73.0	71.5	73.0	75.0
May	77.3	71.4	77.7	70.8	80.0	80.8	72.5	67.8	71.5	72.5	75.0	73.0
June	79.0	70.8	79.0	69.8	84.5	80.8	73.4	68.4	74.5	72.0	80.0	80.0
July	85.5	72.9	87.4	72.9	82.2	75.8	77.2	70.0	82.5	77.5	75.0	80.0
August	81.2	72.4	81.4	72.4	82.7	78.1	78.5	68.0	77.0	69.5	......	75.0
September	79.8	70.0	79.4	69.0	83.0	77.4	77.8	70.8	85.0	67.5	75.0	75.0
October	78.7	74.1	79.5	74.3	82.3	78.1	69.4	67.8	84.0	83.5	75.0	70.0
November	78.0	75.5	77.8	75.5	78.8	76.9	78.2	72.3	79.5	72.0	75.0	75.0
December	76.4	75.5	75.9	75.8	82.7	78.0	74.0	71.6	77.3	74.0	78.0	75.0

POTATOES.

TABLE 62.—*Potatoes: Area and production of undermentioned countries, 1911–1913.*

Country.	Area.			Production.		
	1911	1912	1913	1911	1912	1913
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels*	*Bushels.*
United States	3,619,000	3,711,000	3,668,000	292,737,000	420,647,000	331,525,000
Canada:						
Prince Edward Island	31,000	33,000	32,000	5,581,000	6,741,000	6,219,000
Nova Scotia	31,000	32,000	32,000	5,641,000	9,417,000	5,309,000
New Brunswick	41,000	43,000	43,000	8,826,000	7,558,000	10,629,000
Quebec	124,000	116,000	116,000	15,763,000	15,945,000	20,504,000
Ontario	157,000	158,000	152,000	16,043,000	22,690,000	18,105,000
Manitoba	26,000	27,000	26,000	5,400,000	6,182,000	5,120,000
Saskatchewan	30,000	31,000	31,000	5,510,000	6,552,000	5,138,000
Alberta	24,000	27,000	26,000	4,606,000	5,775,000	4,350,000
British Columbia	15,000	17,000	15,000	3,778,000	3,995,000	3,110,000
Total Canada	479,000	484,000	473,000	71,238,000	84,885,000	78,544,000
Mexico	(1)	(1)	(1)	(2) 924,000	(2) 924,000	(2) 924,000
Newfoundland	(1)	(1)	(1)	1,533,000	1,524,000	1,500,000
Total				368,432,000	507,980,000	412,493,000
SOUTH AMERICA.						
Argentina	267,000	278,000	279,000	36,743,000	38,029,000	40,418,000
Chile	68,000	66,000	78,000	7,440,000	9,656,000	8,753,000
Total	335,000	344,000	357,000	44,183,000	47,685,000	49,171,000
EUROPE.						
Austria-Hungary:						
Austria	3,108,000	3,092,000	3,152,000	426,406,000	460,821,000	424,457,000
Hungary proper	1,534,000	1,530,000	1,513,000	163,067,000	197,812,000	179,133,000
Croatia-Slavonia	190,000	195,000	194,000	23,138,000	21,674,000	21,140,000
Bosnia-Herzegovina	49,000	62,000	67,000	2,329,000	3,472,000	2,998,000
Total Austria-Hungary	4,881,000	4,879,000	4,926,000	614,940,000	683,779,000	627,728,000
Belgium	387,000	387,000	395,000	100,934,000	121,481,000	117,613,000
Bulgaria	8,000	9,000	(1)	509,000	503,000	500,000
Denmark	(1)	151,000	(1)	32,499,000	32,629,000	42,232,000
Finland	184,000	(1)	(1)	22,691,000	23,488,000	23,424,000
France	3,853,000	3,863,000	3,749,000	469,386,000	552,074,000	477,111,000
Germany	8,207,000	8,257,000	8,432,000	1,263,024,000	1,844,863,000	1,988,591,000
Greece	(1)	(1)	(1)	331,000	551,000	400,000
Italy	692,000	514,000	722,000	62,177,000	56,313,000	66,035,000
Luxemburg	36,000	37,000	37,000	4,692,000	8,683,000	7,037,000
Malta	4,000	4,000	4,000	834,000	769,000	(3) 769,000
Netherlands	411,000	426,000	420,000	133,973,000	157,810,000	91,957,000
Norway	(4) 102,000	(4) 102,000	(1)	22,017,000	29,825,000	27,756,000
Roumania [5]	30,000	30,000	25,000	4,240,000	3,748,000	2,521,000
Do. [6]	61,000	60,000	60,000	1,429,000	1,084,000	1,066,000
Russia:						
Russia proper	8,166,000	8,321,000		851,120,000	925,775,000	
Poland	2,606,000	2,656,000		278,309,000	411,281,000	
Northern Caucasia	203,000	190,000		13,609,000	19,768,000	
Total Russia (European)	10,975,000	11,167,000	11,519,000	1,143,038,000	1,356,824,000	1,274,439,000
Servia	31,000	31,000	(1)	2,154,000	2,173,000	2,000,000
Spain	(1)	632,000	(1)	(2) 91,014,000	93,089,000	90,000,000
Sweden	378,000	378,000	383,000	58,391,000	65,765,000	75,367,000
Switzerland	210,000	210,000	210,000	39,315,000	40,785,000	44,974,000

[1] No official statistics.
[2] Data for 1906.
[3] Year preceding.
[4] Census of 1907.
[5] Grown alone.
[6] Grown with corn.

POTATOES—Continued.

TABLE 62.—*Potatoes: Area and production of undermentioned countries, 1911–1913*—Con.

Country.	Area.			Production.		
	1911	1912	1913	1911	1912	1913
EUROPE—continued.						
United Kingdom:	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
England	402,000	437,000	417,000	99,858,000	78,961,000	102,834,000
Scotland	113,000	150,000	149,000	36,407,000	35,041,000	36,243,000
Wales	27,000	26,000	25,000	6,547,000	4,704,000	5,233,000
Ireland	591,000	595,000	582,000	137,941,000	95,077,000	139,602,000
Total United Kingdom	1,163,000	1,208,000	1,173,000	280,753,000	213,783,000	283,912,000
Total				4,348,401,000	5,290,019,000	5,246,032,000
ASIA.						
Japan	169,000	173,000	173,000	25,168,000	25,669,000	25,000,000
Russia (Asiatic)	423,000	479,000	537,000	32,956,000	38,796,000	32,621,000
Total	592,000	652,000	710,000	58,124,000	64,465,000	57,621,000
AFRICA.						
Algeria	43,000	45,000	48,000	1,687,000	1,607,000	2,119,000
Union of South Africa:[1]						
Cape of Good Hope	21,000	(2)	(2)	1,037,000	1,037,000	1,037,000
Natal	9,000	(2)	(2)	507,000	507,000	507,000
Transvaal	19,000	(2)	(2)	1,028,000	1,028,000	1,028,000
Orange Free State	13,000	(2)	(2)	499,000	499,000	499,000
Total Union of South Africa	62,000	(2)	(2)	3,071,000	3,071,000	3,071,000
Total				4,758,000	4,678,000	5,190,000
AUSTRALASIA.						
Australia:						
Queensland	8,000	8,000	9,000	584,000	489,000	612,000
New South Wales[3]	44,000	43,000	34,000	4,518,000	2,806,000	3,421,000
Victoria	63,000	48,000	47,000	6,097,000	4,446,000	7,135,000
South Australia	8,000	7,000	9,000	893,000	846,000	1,235,000
Western Australia	2,000	3,000	5,000	219,000	348,000	506,000
Tasmania	26,000	22,000	25,000	2,617,000	2,321,000	2,709,000
Total Australia	151,000	131,000	129,000	14,928,000	11,256,000	15,618,000
New Zealand	29,000	28,000	23,000	5,283,000	5,410,000	6,614,000
Total Australasia	180,000	159,000	152,000	20,211,000	16,666,000	22,232,000
Grand total				4,842,109,000	5,931,493,000	5,792,739,000

[1] Census figures for 1911 repeated.
[2] No official statistics.
[3] Including Federal Territory.

POTATOES—Continued.

Table 63.—*Potatoes: Total production of countries mentioned in Table 62, 1900–1913.*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bushels.		*Bushels.*		*Bushels.*		*Bushels.*
1900.....	4,382,031,000	1904....	4,298,049,000	1908.....	5,205,043,000	1911....	4,842,109,000
1901.....	4,669,958,000	1905....	5,254,598,000	1909.....	5,595,567,000	1912....	5,931,403,000
1902.....	4,674,000,000	1906....	4,789,112,000	1910.....	5,242,278,000	1913....	5,792,739,000
1903.....	4,409,793,000	1907....	5,122,078,000				

Table 64.—*Potatoes: Average yield, per acre, of undermentioned countries in 1900–1913.*

Year.	United States.	Russia (European).[1]	Germany.[1]	Austria.[1]	Hungary proper.[1]	France.[1]	United Kingdom.[1]
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Average (1900–1909)........	91.4	99.9	200.0	151.1	118.7	133.8	193.8
1904..........................	110.4	88.4	104.2	126.1	86.2	123.4	195.6
1905..........................	87.0	106.6	216.7	182.5	126.8	142.5	218.8
1906..........................	102.2	94.9	193.3	158.4	128.7	99.5	192.2
1907..........................	95.4	102.4	205.3	173.2	126.6	130.2	171.0
1908..........................	85.7	102.9	209.2	154.0	96.6	163.7	231.1
1909..........................	106.1	111.5	208.0	157.3	125.2	160.3	222.1
1910..........................	93.8	121.1	196.1	160.0	117.4	81.9	209.1
1911..........................	80.9	164.2	153.9	137.2	106.3	121.8	241.5
1912..........................	113.4	121.5	223.5	149.0	129.2	145.8	177.0
1913..........................	90.4	110.6	235.8	134.7	112.2	127.2	242.0
Average (1904–1913)......	96.5	106.4	200.7	153.2	115.5	130.2	210.0

[1] Bushels of 60 pounds.

POTATOES—Continued.

TABLE 65.—*Potatoes: Acreage, production, value, exports, etc., in the United States, 1849–1914.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Chicago cash price per bushel, fair to fancy.[1] December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, fiscal year beginning July 1.	Imports during fiscal year beginning July 1.
	Acres.	*Bush.*	*Bushels.*	*Cts.*	*Dollars.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Bushels.*	*Bushels.*
1849...			*65,798,000*							155,595	
1859...			*111,149,000*							380,372	
1866...	1,069,000	100.2	107,201,000	47.3	50,723,000					512,380	198,265
1867...	1,192,000	82.0	97,783,000	65.9	64,462,000					378,605	209,555
1868...	1,132,000	93.8	106,090,000	59.3	62,919,000					508,249	138,470
1869...	1,222,000	109.5	133,886,000	42.9	57,481,000					596,968	75,336
1869...			*143,337,000*								
1870...	1,325,000	86.6	114,775,000	65.0	74,621,000					553,070	458,758
1871...	1,221,000	98.7	120,462,000	53.9	64,905,000					621,537	96,259
1872...	*1,331,000*	*85.3*	*113,516,000*	*53.5*	*60,692,000*					*515,306*	*346,840*
1873...	1,295,000	81.9	106,089,000	65.2	69,154,000					497,413	549,073
1874...	1,310,000	80.9	105,981,000	61.5	65,223,000					609,642	188,757
1875...	1,510,000	110.5	166,877,000	34.4	57,358,000					704,379	92,148
1876...	1,742,000	71.7	124,827,000	61.9	77,320,000					529,650	3,205,555
1877...	1,792,000	94.9	170,092,000	43.7	74,272,000					744,409	528,584
1878...	1,777,000	69.9	124,127,000	58.7	72,924,000					625,342	2,624,149
1879...	1,837,000	98.9	181,626,000	43.6	79,154,000					696,080	721,868
1879...			*169,459,000*								
1880...	1,843,000	91.0	167,660,000	48.3	81,062,000					638,840	2,170,372
1881...	2,042,000	53.5	109,145,000	91.0	99,291,000					408,286	8,789,860
1882...	*2,172,000*	*78.7*	*170,973,000*	*55.7*	*95,305,000*					*439,443*	*2,362,362*
1883...	2,289,000	90.9	208,164,000	42.2	87,849,000					554,613	425,408
1884...	2,221,000	85.8	190,642,000	39.6	75,524,000					380,868	658,633
1885...	2,266,000	77.2	175,029,000	44.7	78,153,000			33	50	494,948	1,937,416
1886...	2,287,000	73.5	168,051,000	46.7	78,442,000	44	47	65	90	434,864	1,432,490
1887...	2,357,000	56.9	134,103,000	68.2	91,507,000	70	83	65	85	403,880	8,259,538
1888...	2,533,000	79.9	202,365,000	40.2	81,414,000	30	37	24	45	471,955	883,380
1889...	2,648,000	77.4	204,881,000	35.4	72,611,000	33	45	30	60	406,618	3,415,578
1889...			*217,546,000*								
1890...	2,652,000	55.9	148,290,000	75.8	112,342,000	82	93	95	110	341,189	5,401,912
1891...	2,715,000	93.7	254,424,000	35.8	91,013,000	30	40	30	50	557,022	186,871
1892...	*2,548,000*	*61.5*	*156,655,000*	*66.1*	*103,568,000*	*60*	*72*	*70*	*98*	*845,720*	*4,317,031*
1893...	2,605,000	70.3	183,034,000	59.4	108,662,000	51	60	64	88	803,111	3,002,578
1894...	2,738,000	62.4	170,787,000	53.6	91,527,000	43	58	40	70	572,957	1,341,533
1895...	2,955,000	100.6	297,237,000	26.6	78,985,000	18	24	10	23	680,049	175,240
1896...	2,767,000	91.1	252,235,000	28.6	72,182,000	18	26	19	26	926,646	246,178
1897...	2,535,000	64.7	164,016,000	54.7	89,643,000	50	62	60	87	605,187	1,171,378
1898...	2,558,000	75.2	192,306,000	41.4	79,575,000	30	36	33	52	579,833	530,420
1899...	2,581,000	88.6	228,783,000	39.0	89,329,000	35	46	27	39	809,472	155,861
1899...	*2,939,000*	*93.0*	*273,318,000*								
1900...	2,611,000	80.8	210,927,000	43.1	90,811,000	40	48	35	60	741,483	371,911
1901...	2,864,000	65.5	187,598,000	76.7	143,979,000	75	82	58	100	528,484	7,656,162
1902...	2,966,000	96.0	284,633,000	47.1	134,111,000	42	48	42	60	843,075	358,505
1903...	2,917,000	84.7	247,128,000	61.4	151,638,000	60	66	95	116	484,042	3,166,581
1904...	3,016,000	110.4	332,830,000	45.3	150,673,000	32	38	20	25	1,163,270	181,199
1905...	2,997,000	87.0	260,741,000	61.7	160,821,000	55	66	48	73	1,000,326	1,948,160
1906...	3,013,000	102.2	308,038,000	51.1	157,547,000	40	43	55	75	1,530,461	176,917
1907...	3,128,000	95.4	298,262,000	61.8	184,184,000	46	58	50	80	1,203,894	403,952
1908...	3,257,000	85.7	278,985,000	70.6	197,039,000	60	77	70	150	763,651	8,383,966
1909...	3,525,000	106.8	376,537,000								
1909...	*3,669,000*	*106.1*	*389,195,000*	54.1	210,667,000	20	58	16	34	999,476	353,208
1910[2]...	3,720,000	93.8	349,032,000	55.7	194,566,000	30	48	35	75	2,383,887	218,984
1911...	3,619,000	80.9	292,737,000	79.9	233,778,000	70	100	90	200	1,237,276	13,734,695
1912...	3,711,000	113.4	420,647,000	50.5	212,550,000	40	65	33	70	2,028,261	327,230
1913...	3,668,000	90.4	331,525,000	68.7	227,903,000	50	70	60	90	1,797,812	1,153,173
1914...	3,708,000	100.5	405,921,000	48.9	198,609,000	30	66				

[1] Burbank to 1910. [2] Figures adjusted to census basis.

POTATOES—Continued.

TABLE 66.—*Potatoes: Acreage, production, and total farm value, by States, 1914.*

[000 omitted.]

State.	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Dollars.*
Maine	130	33,800	11,154
New Hampshire	17	2,703	1,622
Vermont	25	4,200	1,974
Massachusetts	27	4,185	2,971
Rhode Island	5	825	578
Connecticut	24	3,360	2,184
New York	367	53,215	23,415
New Jersey	92	9,936	6,061
Pennsylvania	268	28,140	16,321
Delaware	11	880	616
Maryland	44	3,432	2,059
Virginia	112	7,280	5,606
West Virginia	48	2,592	2,100
North Carolina	33	1,716	1,579
South Carolina	11	770	962
Georgia	13	780	819
Florida	13	1,040	1,175
Ohio	150	14,250	7,552
Indiana	75	6,000	3,360
Illinois	124	7,440	4,538
Michigan	364	44,044	13,213
Wisconsin	304	37,696	11,309
Minnesota	270	30,780	9,850
Iowa	147	12,642	7,459
Missouri	87	3,915	2,858
North Dakota	70	7,630	3,205
South Dakota	63	5,670	2,665
Nebraska	118	9,440	5,098
Kansas	72	4,464	3,437
Kentucky	50	2,250	1,890
Tennessee	35	1,505	1,370
Alabama	18	1,422	1,436
Mississippi	12	960	912
Louisiana	24	1,680	1,630
Texas	44	2,684	2,791
Oklahoma	32	2,240	2,016
Arkansas	25	1,500	1,455
Montana	37	5,180	3,315
Wyoming	15	1,620	1,134
Colorado	73	8,760	4,380
New Mexico	9	900	855
Arizona	1	110	132
Utah	20	2,800	1,680
Nevada	12	1,500	1,002
Idaho	34	5,270	2,530
Washington	59	7,552	4,154
Oregon	49	4,753	2,852
California	75	10,350	7,245
United States	3,708	405,921	198,609

TABLE 67.—*Potatoes: Condition of crop, United States, on first of months named, 1894–1914.*

Year.	July.	Aug.	Sept.	Oct.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*
1894	92.3	74.0	62.4	64.3
1895	91.5	89.7	90.8	87.4
1896	99.0	94.8	83.2	81.7
1897	87.8	77.9	66.7	61.6
1898	95.5	83.9	77.7	72.5
1899	93.8	93.0	86.3	81.7
1900	91.3	88.2	80.0	74.4
1901	87.4	62.3	52.2	54.0
1902	92.9	94.8	89.1	82.5
1903	88.1	87.2	84.3	74.6
1904	93.9	94.1	91.6	89.5
1905	91.2	87.2	80.9	74.3
1906	91.5	89.0	85.3	82.2
1907	90.2	88.5	80.2	77.0
1908	89.6	82.9	73.7	68.7
1909	93.0	85.8	80.9	78.8
1910	86.3	75.8	70.5	71.8
1911	76.0	62.3	59.8	62.3
1912	88.9	87.8	87.2	85.1
1913	86.2	78.0	69.9	67.7
1914	83.6	79.0	75.8	78.3

POTATOES—Continued.

TABLE 68.—*Potatoes: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1905-1914.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	10-year average, 1905-1914.	1910	1911	1912	1913	1914	5-year average, 1910-1914.	1914
Me.	206	175	210	145	225	225	220	180	198	220	260	54	42	77	55	53	33	108.46	85.80
N. H.	128	120	112	120	100	120	150	125	140	122	159	68	52	87	61	83	60	93.76	95.40
Vt.	122	98	101	120	73	135	130	105	140	127	168	59	45	79	55	72	47	77.77	78.96
Mass.	116	97	114	120	95	125	125	93	130	105	135	79	70	96	75	85	71	94.72	110.05
R. I.	127	125	108	110	150	125	136	110	113	130	165	84	69	106	77	90	70	105.99	115.50
Conn.	104	92	98	100	80	120	125	85	107	92	140	82	70	105	78	87	65	86.25	91.00
N. Y.	98	70	105	98	82	120	102	74	106	74	145	62	48	90	58	80	44	60.01	63.80
N. J.	98	93	120	120	72	90	105	73	108	95	108	76	65	105	66	82	61	71.99	65.88
Pa.	87	90	94	88	72	78	88	56	109	88	105	67	52	93	57	80	58	58.25	60.90
Del.	90	93	97	99	82	96	103	60	100	87	80	71	60	96	70	75	70	62.13	56.00
Md.	86	95	93	95	77	80	95	45	112	87	78	64	54	91	58	67	60	52.46	46.80
Va.	81	84	75	80	88	92	98	45	87	94	65	71	58	96	65	80	77	56.37	50.05
W. Va.	84	88	97	83	84	98	92	45	112	83	54	76	67	104	62	90	81	59.26	43.74
N. C.	75	77	75	88	79	74	89	48	85	80	52	81	73	108	76	82	92	58.97	47.84
S. C.	80	83	82	70	81	85	90	70	90	80	70	114	105	122	112	130	125	94.44	87.50
Ga.	76	65	77	83	78	81	82	72	78	81	60	104	105	110	87	105	105	76.24	63.00
Fla.	85	75	85	80	83	95	90	90	93	76	80	116	100	145	110	117	113	100.42	90.40
Ohio.	85	78	110	76	77	93	82	65	112	64	95	64	51	84	53	85	53	52.11	50.35
Ind.	80	80	89	87	57	95	84	58	114	53	80	64	50	87	50	84	56	47.76	44.80
Ill.	75	75	97	87	71	91	75	50	101	46	60	70	59	90	60	69	61	45.48	36.60
Mich.	95	67	95	90	72	105	105	94	105	96	121	45	31	71	41	53	30	45.90	36.30
Wis.	100	68	97	91	80	102	95	116	120	109	124	45	38	62	34	54	30	48.98	37.20
Minn.	100	82	92	101	76	115	61	115	135	110	114	45	64	58	28	52	32	47.44	30.48
Iowa.	82	80	95	85	80	89	72	74	109	48	86	58	60	73	46	82	59	47.49	50.74
Mo.	69	82	84	82	80	85	86	27	84	38	45	73	68	102	69	93	73	42.43	32.85
N. Dak.	96	95	98	89	85	110	41	120	128	85	109	52	91	55	28	56	42	46.51	45.78
S. Dak.	84	96	100	84	90	80	44	72	105	78	90	54	85	70	36	63	47	43.41	42.30
Nebr.	73	93	87	73	78	78	60	52	80	48	80	63	84	92	51	78	54	43.94	43.20
Kans.	65	81	79	65	80	79	57	22	82	40	62	83	90	106	73	91	77	43.72	47.74
Ky.	73	85	82	80	62	92	92	39	101	49	45	76	62	107	67	102	84	50.84	37.80
Tenn.	72	80	80	85	80	75	80	41	88	64	43	77	65	108	70	97	91	51.82	39.13
Ala.	82	80	75	95	85	80	80	78	81	84	79	98	94	118	90	105	101	81.63	79.79
Miss.	88	110	85	90	91	87	85	83	89	80	80	95	94	115	90	100	95	82.29	76.00
La.	69	64	62	67	82	75	55	69	73	70	70	90	90	100	83	96	97	62.84	67.90
Tex.	62	64	77	73	71	50	51	57	63	52	61	105	110	126	105	112	104	63.15	63.44
Okla.	64	76	80	70	78	70	60	18	60	60	70	97	100	124	93	105	90	52.82	63.00
Ark.	71	65	80	70	82	70	84	55	70	72	60	90	85	115	92	100	97	65.85	58.20
Mont.	146	120	152	150	138	180	120	150	165	140	140	62	85	74	40	67	64	92.48	89.60
Wyo.	133	170	115	200	158	160	100	42	140	140	108	74	82	140	60	65	70	78.28	75.60
Colo.	118	160	125	150	125	160	100	35	95	115	120	60	55	99	41	65	50	52.67	60.00
N. Mex.	88	75	121	100	100	85	47	80	100	68	100	97	104	100	65	140	95	76.82	95.00
Ariz.	116	104	192	140	110	.....	92	95	125	75	110	131	126	140	125	135	120	127.68	132.00
Utah.	152	132	165	100	160	180	142	140	185	180	140	57	59	85	49	58	60	96.37	84.00
Nev.	157	120	175	200	120	180	150	160	178	160	130	77	80	93	60	68	70	115.08	91.00
Idaho.	162	140	175	145	130	200	142	180	185	170	155	51	65	65	29	50	48	84.47	74.40
Wash.	142	142	129	150	120	170	131	160	167	123	128	56	73	68	36	60	55	81.75	70.40
Oreg.	122	110	101	125	99	160	105	130	155	135	97	59	70	67	31	58	60	69.03	58.20
Cal.	132	165	125	145	107	130	130	135	130	119	138	76	85	90	65	70	70	99.28	96.60
U. S.	96.5	87.0	102.2	95.4	85.7	106.8	93.8	80.9	113.4	90.4	109.5	60.4	55.7	79.9	50.5	68.7	48.9	57.97	53.56

[1] Based upon farm price Dec. 1.

POTATOES—Continued.

TABLE 69.—*Potatoes: Farm price per bushel on first of each month, by geographical divisions, 1913 and 1914.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	68.4	50.6	71.3	59.1	85.1	70.0	59.7	44.1	64.3	44.0	105.1	88.2	64.5	40.1
February	69.7	53.1	73.5	62.6	88.2	76.0	60.1	45.0	65.7	46.6	107.6	92.5	64.2	40.0
March	70.7	52.0	72.7	60.8	88.5	77.4	61.0	44.0	68.5	45.6	111.6	93.8	65.9	41.5
April	70.0	50.3	75.0	56.7	93.0	80.6	59.0	42.2	68.7	44.0	110.5	89.8	58.2	39.9
May	71.4	48.2	78.1	57.2	94.4	77.0	61.7	39.1	68.0	41.8	110.1	88.6	57.1	35.0
June	71.3	55.2	77.5	70.2	89.5	84.0	64.0	48.7	68.3	43.8	109.5	90.9	56.4	35.4
July	81.5	49.8	85.2	60.9	99.9	78.7	73.8	39.4	83.5	41.5	109.6	81.4	67.7	40.8
August	87.1	69.2	91.7	71.8	97.8	76.4	87.5	66.5	80.3	68.9	106.4	81.6	75.3	64.2
September	74.9	75.3	70.8	79.5	92.3	83.5	70.3	69.1	67.9	67.9	111.1	90.2	80.5	65.4
October	64.7	73.9	59.8	74.9	89.1	80.4	60.6	74.8	57.2	71.2	107.2	102.5	66.6	63.1
November	52.8	69.6	49.6	72.1	82.7	81.7	38.6	67.3	44.7	66.6	99.6	101.4	65.3	59.0
December	48.9	68.7	47.2	72.6	80.7	83.8	36.5	61.1	46.4	65.5	94.8	102.4	60.1	63.2

TABLE 70.—*Potatoes: Wholesale price, 1900–1914.*

Date.	New York.		Chicago.		Minneapolis.		St. Louis.		Cincinnati.		Denver.		San Francisco.	
	State and western, per 180 pounds.		Fair to fancy, per bushel.[1]		Per bushel.		Burbank, per bushel.		Per bushel.[2]		Per 100 pounds.		Burbank, Rivers, per 100 pounds.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
1900	100	187	25	50	15	45	27	54	32	57	70	190	25	100
1901	112	300	30	125	30	110	18	140	30	120	90	325	30	120
1902	150	312	30	100	20	115	41	105	90	300	75	195	25	165
1903	125	237	38	85	35	100	40	125	120	300	90	250	30	175
1904	125	387	31	122	30	150	36	125	120	480	55	200	40	185
1905	75	262	18	72	25	110	27	175	25	80	50	150	35	125
1906	125	325	40	87	40	200	35	125	45	105	100	200	25	145
1907	100	275	30	75	40	120	43	125	25	85	100	250	50	350
1908	187	287	50	150	50	225	62	105	60	135	100	300	30	125
1909	150	337	15	150	45	140	35	140	30	120	90	400	50	225
1910	87	200	10	98	25	325	23	100	30	65	50	400	30	150
1911	112	312	30	225	45	180	42	200	40	195	115	500	85	275
1912	50	450	32	200	25	140	35	152	50	150	75	450	40	225
1913	170	287	15	82	33	100	30	93	30	100	50	400	20	165
1914.														
January	225	250	56	100	60	85	65	78	65	80	140	160	110	195
February	212	300	58	90	58	85	68	75	70	75	115	160	100	145
March	200	287	58	85	58	80	65	73	67	75	100	160	80	110
April	225	275	60	90	55	80	65	82	67	82	100	135	85	110
May	212	287	60	90	55	110	68	90	75	90	100	175	100	120
June	200	287	67	175	83	135	75	160	85	115	100	250	90	140
July	......	......	45	165	100	150	[3] 40	[3] 150	160	170	160	275	100	130
August	......	......	45	100	55	75	[3] 52	[3] 75	80	85	140	225	75	105
September	165	212	40	90	53	80	53	92	70	85	100	175	80	105
October	125	190	35	55	30	65	40	56	50	75	90	135	70	100
November	150	185	28	52	28	55	83	65	45	55	90	115	60	85
December	125	165	30	66	28	55	38	50	45	55	90	115	85	110
Year	125	300	28	175	28	150	33	160	45	170	90	275	60	165

[1] Burbank to 1910.
[2] Per barrel 1900, 1902–1904, and from August to November, 1914.
[3] Early Ohio, home grown.

POTATOES—Continued.

TABLE 71.—*Potatoes: International trade, calendar years 1911–1913.*

[See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.)	Country.	1911	1912	1913 (prelim.)
	Bushels.	*Bushels.*	*Bushels.*		*Bushels.*	*Bushels.*	*Bushels.*
Argentina	41	703	794	Netherlands	16,814	17,260	15,279
Austria-Hungary	2,145	1,029	1,179	Portugal	516	429	1 429
Belgium	7,550	9,160	9,067	Russia	11,108	9,171	2,977
Canada	675	935	2,012	Spain	1,286	1,718	2,570
China	212	307	340	United Kingdom	4,362	13,466	911
Denmark	1,478	795	510	United States	1,995	1,631	1,817
France	10,994	8,401	6,653	Other countries	1,642	2,379	1,639
Germany	20,411	4,608	12,216				
Italy	3,156	3,592	5,177	Total	84,895	76,382	63,979
Japan	510	498	403				

IMPORTS.

Country.	1911	1912	1913 (prelim.)	Country.	1911	1912	1913 (prelim.)
Argentina	3,418	280	314	Norway	419	51	176
Austria-Hungary	4,251	3,452	4,506	Philippine Islands	296	377	380
Belgium	6,351	3,728	4,683	Russia	265	268	182
Brazil	656	1,065	1,095	Sweden	706	660	660
Canada	388	786	400	Switzerland	2,955	3,119	3,443
Cuba	1,893	1,885	2,225	United Kingdom	5,998	10,703	17,444
Egypt	600	647	549	United States	1,542	12,409	3,171
Finland	592	459	385	Other countries	1,769	2,656	2,203
France	6,790	6,149	8,579				
Germany	43,287	30,214	14,038	Total	84,765	89,134	66,374
Netherlands	2,589	1,226	2,041				

SWEET POTATOES.

TABLE 72.—*Sweet potatoes: Acreage, production, and value, in the United States, 1849–1914.*

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Bushels.*	*Cents.*	*Dollars.*
1849[1]			38,268,000		
1859[1]			42,095,000		
1869[1]			21,710,000		
1879[1]			33,379,000		
1889[1]			43,950,000		
1899[1]	537,000	79.1	42,517,000		
1909[1]	641,000	92.4	59,232,000	69.4	41,052,000
1910	641,000	93.5	59,938,000	67.1	40,216,000
1911	605,000	90.1	54,538,000	75.5	41,202,000
1912	583,000	95.2	55,479,000	72.6	40,264,000
1913	625,000	94.5	59,057,000	72.6	42,884,000
1914	603,000	93.8	56,574,000	73.0	41,294,000

[1] Census figures.

SWEET POTATOES—*Continued.*

TABLE 73.—*Sweet potatoes: Acreage, production, and total farm value, by States, 1914.*

[000 omitted.]

State.	Acreage.	Production.	Farm value, Dec. 1.	State.	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Dollars.*		*Acres.*	*Bushels.*	*Dollars.*
New Jersey	22	2,200	2,000	Missouri	6	504	484
Pennsylvania	1	105	90	Kansas	5	550	583
Delaware	5	600	420	Kentucky	10	1,050	898
Maryland	8	1,000	700	Tennessee	25	2,500	1,725
Virginia	31	2,852	2,168	Alabama	63	5,859	3,808
West Virginia	2	184	180	Mississippi	50	4,500	2,835
North Carolina	76	6,840	4,446	Louisiana	59	5,133	3,285
South Carolina	48	4,080	2,856	Texas	52	5,252	4,569
Georgia	79	6,715	4,633	Oklahoma	6	612	545
Florida	19	2,280	1,824	Arkansas	18	1,710	1,317
Ohio	1	110	106	California	6	968	840
Indiana	1	100	90				
Illinois	8	672	618	United States	603	56,574	41,294
Iowa	2	200	254				

TABLE 74.—*Sweet potatoes: Condition of crop, United States, on first of months named, 1894-1914.*

Year.	July.	Aug.	Sept.	Oct.	Year.	July.	Aug.	Sept.	Oct.	Year.	July.	Aug.	Sept.	Oct.
1894	88.4	89.7	91.4	91.6	1901	93.1	80.7	78.7	79.0	1908	89.8	88.8	86.7	86.5
1895	91.4	91.0	89.3	81.2	1902	83.6	78.3	77.2	79.7	1909	89.7	86.9	81.3	77.8
1896	89.3	87.1	71.7	71.1	1903	90.2	88.7	91.1	83.7	1910	87.3	85.7	83.9	80.2
1897	86.5	86.4	85.4	......	1904	87.3	88.5	89.9	86.1	1911	78.4	77.7	79.1	78.1
1898	......	92.0	90.6	89.9	1905	90.6	90.1	89.5	88.6	1912	86.9	85.0	84.1	82.0
1899	85.1	84.1	80.7	74.9	1906	90.9	91.2	88.7	86.0	1913	86.5	85.8	81.4	80.1
1900	93.7	92.2	83.6	80.0	1907	85.9	85.7	85.7	82.7	1914	77.1	[illegible]	81.8	80.7

SWEET POTATOES—Continued.

TABLE 75.—*Sweet potatoes: Yield per acre, price per bushel, Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1905-1914.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	10-year average, 1905-1914.	1910	1911	1912	1913	1914	5-year average, 1910-1914.	1914
N. J.	122	112	125	105	133	123	140	130	120	138	100	82	61	100	84	78	95	103.77	95.00
Pa.	106	140	105	109	102	88	105	121	120	110	105	84	75	105	75	90	86	97.02	90.30
Del.	122	123	128	93	125	125	115	140	120	135	120	63	55	70	68	60	70	81.57	84.00
Md.	118	125	115	100	110	115	110	115	125	141	125	65	58	75	63	60	70	80.18	87.50
Va.	96	103	92	86	95	100	100	90	90	108	92	68	63	74	75	70	76	68.52	69.92
W. Va.	95	89	92	86	72	100	101	110	115	91	92	89	88	100	90	100	98	96.71	90.16
N. C.	94	95	87	90	93	99	105	86	90	100	90	57	55	63	62	61	65	57.45	58.50
S. C.	88	82	78	83	88	95	91	84	105	92	85	64	64	72	68	75	70	63.72	59.50
Ga.	86	80	83	95	86	93	83	81	90	87	85	65	65	73	66	68	69	58.06	58.65
Fla.	109	100	110	105	115	105	108	108	112	119	120	72	75	83	73	75	80	86.18	96.00
Ohio	102	110	108	85	83	110	98	113	118	90	110	92	86	100	87	106	96	100.19	105.60
Ind.	97	97	100	90	71	101	104	114	116	78	100	89	83	96	89	103	90	93.87	90.00
Ill.	95	115	101	90	80	110	110	89	98	70	84	95	89	110	95	106	95	88.58	79.80
Iowa	92	73	92	75	93	110	98	105	90	80	100	114	105	110	108	150	127	112.52	127.00
Mo.	88	102	98	82	91	90	102	91	88	56	84	90	83	105	95	105	96	80.65	80.64
Nebr.	91	105	120	93	85	92	90	80	78	64	105	127	150	147	110	140	130	112.90	136.50
Kans.	95	112	110	95	105	96	101	75	99	50	110	103	103	130	103	110	106	95.02	116.60
Ky.	89	89	90	85	84	88	85	96	90	75	105	78	75	88	85	94	77	75.22	80.85
Tenn.	88	101	80	82	89	87	85	85	90	80	100	68	60	75	72	80	69	64.04	69.00
Ala.	89	93	82	80	85	80	85	97	100	95	93	65	65	68	71	67	65	63.26	60.45
Miss.	92	108	85	92	92	82	94	85	97	98	90	62	60	62	62	62	63	57.34	56.70
La.	86	70	90	86	86	90	93	90	84	85	87	62	65	60	65	70	64	56.85	55.68
Tex.	78	87	96	75	88	50	56	71	75	80	101	89	108	104	104	95	87	75.24	87.87
Okla.	89	124	118	85	88	70	70	75	92	64	102	100	110	125	109	104	89	85.67	90.78
Ark.	85	60	90	75	100	58	98	92	88	90	95	78	73	82	90	80	77	74.27	73.15
N. Mex.	135	90	100	200	125	180	100	150	141	125	143	125	118	144	105	130	113	161.23	161.59
Ariz.	147	125	100	150	140	163	120	200	140	135	200	147	140	160	150	170	150	245.50	300.00
Cal.	142	125	115	130	105	160	160	140	156	170	161	92	95	110	94	100	87	152.54	140.07
U. S.	92.0	92.6	90.2	88.2	92.4	90.1	93.5	90.1	95.2	94.5	93.8	69.0	67.1	75.5	72.6	72.6	73.0	67.40	68.48

[1] Based upon farm price Dec. 1.

SWEET POTATOES—Continued.

TABLE 76.—*Sweet potatoes: Wholesale price per barrel, 1900–1914.*

Date.	Baltimore.		St. Louis.		New Orleans.		New York.			
							Jersey.		Southern.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1900	$0.75	$4.50	$1.00	$6.25	$1.00	$2.00	$1.25	$5.00	$0.50	$3.00
1901	.50	6.00	.88	8.75	.75	1.75	1.50	4.00	.50	3.25
1902	.75	5.00	.63	7.50	1.25	2.75	1.50	5.25	.75	5.00
1903	.75	4.00	.75	6.25	.75	2.50	1.50	4.00	.50	5.00
1904	.75	5.00	.88	5.50	.75	1.75	1.00	5.00	.50	4.50
1905	.75	4.50	.50	5.00	.50	2.00	1.25	5.50	.35	4.50
1906	.60	4.25	.60	5.00	1.25	2.50	1.25	3.50	.50	4.50
1907	1.00	5.00	.75	7.50	1.00	2.75	1.00	4.00	1.50	6.00
1908	1.00	5.00	.88	7.50	1.00	2.75	1.50	4.50	1.00	5.00
1909	.85	5.50	.38	6.25	.75	2.75	1.25	4.00	.75	4.50
1910	1.00	4.00	.50	4.38	1.00	2.40	1.00	3.00	.30	5.00
1911	1.25	6.25	1.25	6.25	1.00	3.00	1.50	3.75	1.00	7.00
1912	1.00	6.00	.75	5.00	1.75	2.00	1.50	3.50	.50	6.00
1913	.75	7.00	.88	6.25	2.00	2.00	1.25	3.50	.40	5.50
1914.										
January	1.00	2.50	2.00	2.50			1.50	2.00	.75	1.25
February	1.00	2.00	2.25	2.50	1.20	1.50	1.50	2.00		
March	1.00	2.25	1.50	2.00	1.20	1.60	1.50	2.00	1.00	1.25
April	1.00	2.25	2.50	2.50	1.00	3.20	1.50	2.00	1.00	1.50
May	1.50	2.25	2.00	2.50	1.20	3.00	1.50	2.00	1.00	1.50
June					1.60	2.80				
July	3.00	5.50			1.60	2.70			2.50	5.00
August	1.00	4.00	2.75	4.50	1.60	2.70			1.25	4.50
September	1.00	2.75	2.00	3.50	1.00	3.50	2.00	3.25	1.25	3.25
October	1.40	2.15	1.75	2.75	1.00	1.00	2.00	3.00	.75	2.50
November	1.40	2.60	2.40	3.50	.80	1.00	2.00	3.50	1.50	3.00
December	2.00	3.75	3.25	3.65	.80	1.20	2.50	3.50	1.00	3.00
Year	1.00	5.50	1.50	4.50	.80	3.50	1.50	3.50	.75	5.00

HAY.

TABLE 77.—*Hay: Acreage, production, value, exports, etc., in the United States, 1849–1914.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per ton Dec. 1.	Farm value Dec. 1.	Chicago prices No. 1 timothy per ton, by carload lots. December. Low.	December. High.	Following May. Low.	Following May. High.	Domestic exports, fiscal year beginning July 1.
	Acres.	*Tons.*[1]	*Tons.*[1]	*Dolls.*	*Dollars.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Tons.*[2]
1849			*13,830,000*							
1859			*19,084,000*							
1866	17,669,000	1.23	21,779,000	10.14	220,836,000					5,028
1867	20,021,000	1.31	26,277,000	10.21	268,301,000					5,645
1868	21,542,000	1.21	26,142,000	10.08	263,589,000					
1869	18,591,000	1.42	26,420,000	10.18	268,933,000					6,723
1869			*27,316,000*							
1870	19,862,000	1.23	24,525,000	12.47	305,743,000					4,581
1871	19,009,000	1.17	22,239,000	14.30	317,940,000					5,266
1872	20,319,000	1.17	23,813,000	12.94	308,025,000					4,557
1873	21,894,000	1.15	25,085,000	12.53	314,241,000					4,889
1874	21,770,000	1.15	25,134,000	11.94	300,222,000					7,183
1875	23,508,000	1.19	27,874,000	10.78	300,378,000					7,528
1876	25,283,000	1.22	30,867,000	8.97	276,991,000			9.00	10.00	7,287
1877	25,368,000	1.25	31,629,000	8.37	264,880,000	9.50	10.60	9.75	10.75	9,514
1878	26,931,000	1.47	39,608,000	7.20	285,016,000	8.00	8.50	9.00	11.50	8,127
1879	27,485,000	1.29	35,493,000	9.32	330,804,000	14.00	14.50	14.00	15.00	13,730
1879	*30,631,000*	*1.15*	*35,151,000*							
1880	25,864,000	1.23	31,925,000	11.65	371,811,000	15.00	15.50	17.00	19.00	12,662
1881	30,889,000	1.14	35,135,000	11.82	415,131,000	16.00	16.50	15.00	16.60	10,570
1882	32,340,000	1.18	38,138,000	9.73	371,170,000	11.50	12.25	12.00	13.00	13,309
1883	35,516,000	1.32	46,864,000	8.19	383,834,000	9.00	10.00	12.50	17.00	16,908
1884	38,572,000	1.26	48,470,000	8.17	396,139,000	10.00	11.50	15.50	17.50	11,142
1885	39,850,000	1.12	44,732,000	8.71	389,753,000	11.00	12.00	10.00	12.00	13,390
1886	36,502,000	1.15	41,796,000	8.46	353,438,000	9.50	10.50	11.00	12.50	13,873
1887	37,665,000	1.10	41,454,000	9.97	413,440,000	13.50	14.50	17.00	21.00	18,198
1888	38,592,000	1.21	46,643,000	8.76	408,500,000	11.00	11.50	10.50	21.00	21,928
1889	52,949,000	1.26	66,831,000	7.04	470,394,000	9.00	10.00	9.00	14.00	36,274
1889	*52,949,000*	*1.26*	*66,831,000*							
1890	50,713,000	1.19	60,198,000	7.87	473,570,000	9.00	10.50	12.50	15.50	28,066
1891	51,044,000	1.19	60,818,000	8.12	494,114,000	12.50	15.00	13.50	14.00	35,201
1892	50,853,000	1.18	59,824,000	8.20	490,428,000	11.00	11.50	12.00	13.50	33,084
1893	49,613,000	1.33	65,766,000	8.68	570,883,000	10.00	10.50	10.00	10.50	54,446
1894	48,321,000	1.14	54,874,000	8.54	468,578,000	10.00	11.00	10.00	10.25	47,117
1895	44,206,000	1.06	47,079,000	8.35	393,186,000	12.00	12.50	11.50	12.00	59,052
1896	*43,260,000*	*1.37*	*59,282,000*	*6.55*	*388,146,000*	*8.00*	*8.50*	*8.50*	9.00	*61,658*
1897	42,427,000	1.43	60,665,000	6.62	401,391,000	8.00	8.50	9.50	10.50	81,827
1898	42,781,000	1.55	66,377,000	6.00	398,061,000	8.00	8.25	9.50	10.50	64,916
1899	41,328,000	1.37	56,656,000	7.27	411,926,000	10.50	11.50	10.50	12.50	72,716
1899	*52,351,000*	*1.09*	*57,002,000*							
1900	39,133,000	1.28	50,111,000	8.89	445,539,000	11.50	14.00	12.50	13.50	89,364
1901	39,391,000	1.28	50,591,000	10.01	506,192,000	13.00	13.50	12.50	13.50	153,431
1902	39,825,000	1.50	59,858,000	9.06	542,036,000	12.00	12.50	13.50	15.00	50,974
1903	*39,934,000*	*1.54*	*61,306,000*	*9.07*	*556,276,000*	*10.00*	*12.00*	*12.00*	*15.00*	*60,730*
1904	39,999,000	1.52	60,696,000	8.72	529,108,000	10.50	11.50	11.00	12.00	66,557
1905	39,362,000	1.54	60,532,000	8.52	515,960,000	10.00	12.00	11.50	12.50	70,172
1906	42,476,000	1.35	57,146,000	10.37	592,540,000	15.50	18.00	15.50	20.50	58,602
1907	44,028,000	1.45	63,677,000	11.68	743,507,000	13.00	17.50	13.00	14.00	77,281
1908	46,486,000	1.52	70,798,000	8.98	635,423,000	11.50	12.00	12.00	13.00	64,641
1909	45,744,000	1.42	64,938,000							
1909	*51,041,000*	*1.35*	*68,833,000*	10.50	722,401,000	16.00	17.00	12.50	16.00	55,007
1910[3]	51,015,000	1.36	69,378,000	12.14	842,252,000	16.00	19.00	18.50	23.50	55,223
1911	48,240,000	1.14	54,916,000	14.29	784,926,000	20.00	22.00	24.00	28.00	59,730
1912	49,530,000	1.47	72,691,000	11.79	856,695,000	13.00	18.00	14.00	16.50	60,720
1913	[illegible]	1.31	64,116,000	12.43	797,077,000	14.50	18.00	15.00	17.50	50,149
1914	49,145,000	1.43	70,071,000	11.12	779,068,000	15.00	16.00			

[1] 2,000 pounds. [2] 2,240 pounds. [3] Figures adjusted to census basis.

HAY—Continued.

TABLE 78.—*Hay: Acreage, production, and total farm value, by States, 1914.*

[000 omitted.]

State.	Acreage.	Production.	Farm value, Dec. 1.
	Acres.	*Tons.*	*Dollars.*
Maine	1,230	1,414	18,523
New Hampshire	520	598	10,166
Vermont	990	1,188	17,345
Massachusetts	480	634	13,631
Rhode Island	58	68	1,374
Connecticut	375	469	9,146
New York	4,653	5,584	81,526
New Jersey	361	487	9,496
Pennsylvania	3,141	4,020	58,290
Delaware	72	79	1,343
Maryland	300	448	6,854
Virginia	650	465	8,050
West Virginia	696	640	11,008
North Carolina	320	368	6,293
South Carolina	210	242	4,114
Georgia	250	338	5,476
Florida	48	65	1,118
Ohio	2,812	3,178	42,585
Indiana	1,764	1,764	24,872
Illinois	2,250	1,912	27,533
Michigan	2,352	3,011	36,132
Wisconsin	2,550	4,462	41,497
Minnesota	1,743	3,294	20,093
Iowa	2,950	4,071	41,117
Missouri	2,600	1,820	24,752
North Dakota	400	580	3,016
South Dakota	500	850	4,845
Nebraska	1,500	2,535	17,492
Kansas	1,650	2,492	18,441
Kentucky	750	712	11,392
Tennessee	800	990	16,320
Alabama	220	288	3,974
Mississippi	210	304	3,648
Louisiana	200	380	4,560
Texas	450	788	7,722
Oklahoma	450	508	4,013
Arkansas	320	336	4,334
Montana	700	1,750	15,225
Wyoming	500	1,150	8,625
Colorado	970	2,328	17,227
New Mexico	206	515	4,790
Arizona	142	454	8,995
Utah	406	1,116	8,593
Nevada	247	803	6,666
Idaho	705	1,868	13,634
Washington	796	1,751	19,261
Oregon	858	1,716	15,787
California	2,700	5,265	43,173
United States	49,145	70,071	779,068

HAY—Continued.

TABLE 79.—*Hay: Yield per acre, price per ton Dec. 1, and value per acre, by States.*

State.	Yield per acre (tons). 10-year average, 1905–1914.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	Farm price per ton (dollars). 10-year average, 1905–1914.	1910	1911	1912	1913	1914	Value per acre (dollars).[1] 5-year average, 1910–1914.	1914
Me.	1.13	1.08	1.20	1.50	0.90	0.95	1.25	1.10	1.16	1.00	1.15	12.92	12.80	14.40	13.70	13.90	13.10	15.34	15.07
N. H.	1.12	1.10	1.15	1.35	.92	.97	1.20	1.05	1.25	1.00	1.15	15.74	15.80	17.20	15.00	17.20	17.00	18.50	19.55
Vt.	1.31	1.35	1.29	1.60	1.11	1.25	1.35	1.30	1.50	1.28	1.20	12.99	12.40	14.00	14.00	14.50	14.60	18.40	17.52
Mass.	1.24	1.33	1.31	1.30	1.20	1.15	1.28	1.08	1.25	1.21	1.32	19.33	19.10	23.00	21.50	21.10	21.50	26.02	28.38
R. I.	1.18	1.09	1.06	1.35	1.50	1.10	1.18	1.00	1.13	1.17	1.17	19.58	19.60	24.10	22.20	21.20	20.20	24.15	23.63
Conn.	1.19	1.12	1.17	1.30	1.20	1.15	1.35	1.10	1.15	1.14	1.25	18.62	19.00	23.50	22.50	20.10	19.50	24.93	24.38
N. Y.	1.20	1.30	1.28	1.25	1.20	1.05	1.32	1.02	1.25	1.14	1.20	14.08	13.70	17.90	14.90	15.30	14.60	17.98	17.52
N. J.	1.31	1.13	1.32	1.45	1.60	1.25	1.50	1.05	1.44	1.30	1.35	17.70	18.20	22.00	20.00	19.00	19.50	26.04	26.32
Pa.	1.34	1.50	1.30	1.45	1.50	1.20	1.38	1.00	1.43	1.32	1.28	14.77	15.00	20.00	15.60	14.90	14.50	20.25	18.56
Del.	1.32	1.55	1.25	1.40	1.60	1.40	1.43	.88	1.33	1.30	1.10	15.87	14.80	22.50	15.00	15.70	17.00	20.00	18.70
Md.	1.28	1.30	1.26	1.40	1.60	1.20	1.35	.72	1.51	1.26	1.15	15.05	15.40	22.40	14.40	15.20	15.30	19.08	17.60
Va.	1.16	1.30	1.25	1.40	1.30	1.30	1.19	.64	1.20	1.27	.72	15.23	14.50	20.50	15.20	15.50	17.20	16.14	12.38
W. Va.	1.24	1.48	1.40	1.45	1.15	1.25	1.20	.66	1.38	1.25	.92	14.76	15.00	20.00	15.00	14.90	17.20	17.27	15.82
N. C.	1.38	1.60	1.54	1.50	1.50	1.38	1.50	1.05	1.30	1.31	1.15	15.41	14.60	17.00	16.70	16.50	17.10	20.55	19.66
S. C.	1.26	1.42	1.46	1.50	1.25	1.23	1.25	1.08	1.15	1.16	1.15	16.21	16.00	17.00	18.00	18.70	17.00	20.06	19.55
Ga.	1.48	1.50	1.65	1.75	1.75	1.35	1.40	1.35	1.35	1.40	1.35	16.42	16.40	17.00	17.00	17.90	16.20	23.16	21.87
Fla.	1.36	1.48	1.50	1.35	1.35	1.38	1.33	1.30	1.25	1.35	1.35	16.90	17.00	18.50	18.10	18.20	17.20	23.41	23.22
Ohio	1.33	1.49	1.22	1.45	1.53	1.43	1.39	.98	1.36	1.30	1.13	12.20	12.50	18.90	13.00	12.80	13.40	17.07	15.14
Ind.	1.29	1.48	1.10	1.35	1.50	1.40	1.30	.94	1.37	1.00	1.00	11.96	11.90	16.80	11.40	14.10	14.10	15.02	14.10
Ill.	1.20	1.35	.98	1.40	1.53	1.15	1.33	.82	1.30	.98	.85	12.00	12.00	17.00	12.60	14.10	14.40	14.47	12.24
Mich.	1.29	1.46	1.28	1.25	1.45	1.30	1.30	1.16	1.33	1.05	1.28	11.91	13.60	17.00	12.70	13.10	12.00	16.68	15.36
Wis.	1.49	1.80	1.35	1.35	1.70	1.53	1.00	1.20	1.60	1.62	1.75	10.86	15.10	15.60	12.10	11.10	9.30	17.49	16.28
Minn.	1.55	1.75	1.70	1.70	1.68	1.73	1.00	1.00	1.53	1.50	1.89	7.03	9.10	11.90	6.40	6.60	6.10	10.44	11.53
Iowa	1.39	1.70	1.35	1.40	1.70	1.64	1.05	.80	1.40	1.48	1.38	8.42	9.60	12.50	9.50	9.60	10.10	12.31	13.94
Mo.	1.06	1.10	.78	1.40	1.50	1.35	1.30	.60	1.30	.60	.70	10.28	9.20	13.30	9.80	14.50	13.60	10.18	9.52
N. Dak.	1.26	1.55	1.45	1.30	1.30	1.37	.55	1.10	1.40	1.14	1.45	5.62	7.60	7.00	5.50	5.80	5.20	6.75	7.54
S. Dak.	1.32	1.60	1.50	1.40	1.50	1.50	.80	.55	1.46	1.20	1.70	5.71	7.10	8.50	6.10	6.50	5.70	7.35	9.69
Nebr.	1.39	1.75	1.40	1.50	1.55	1.50	1.00	.85	1.35	1.34	1.69	6.95	8.90	9.70	8.40	8.70	6.90	10.36	11.66
Kans.	1.28	1.55	1.28	1.15	1.50	1.45	1.15	.85	1.50	.90	1.51	7.55	7.80	9.90	7.60	12.50	7.40	10.24	11.17
Ky.	1.20	1.30	1.35	1.35	1.35	1.36	1.29	.95	1.23	.87	.95	13.69	13.10	17.30	13.70	16.50	16.00	15.95	15.20
Tenn.	1.37	1.60	1.51	1.50	1.50	1.50	1.40	1.00	1.30	1.21	1.20	14.37	13.40	16.70	15.80	16.20	17.00	19.20	20.40
Ala.	1.55	1.90	1.95	1.80	1.60	1.50	1.43	1.40	1.25	1.36	1.31	13.57	13.20	12.80	14.60	14.20	13.80	18.49	18.08
Miss.	1.54	1.75	1.90	1.60	1.50	1.47	1.42	1.50	1.48	1.33	1.45	11.93	12.20	11.00	12.50	13.50	12.00	17.54	17.40
La.	1.72	2.30	1.93	2.00	1.40	1.50	1.75	1.30	1.65	1.50	1.90	12.04	11.50	12.00	12.70	12.50	12.00	19.65	22.80
Tex.	1.41	1.90	1.80	1.30	1.65	.95	1.15	1.00	1.40	1.16	1.75	10.34	12.00	11.90	10.40	11.80	9.80	14.22	17.15
Okla.	1.14	1.41	1.40	1.20	1.45	.90	1.05	.80	1.25	.85	1.13	7.16	8.40	8.00	7.40	10.40	7.90	8.45	8.93
Ark.	1.33	1.75	1.60	1.25	1.50	1.25	1.35	1.15	1.23	1.20	1.05	11.42	11.00	13.00	12.00	13.50	12.90	14.86	13.54
Mont.	1.85	1.60	1.85	1.70	2.00	1.79	1.40	2.00	1.90	1.80	2.50	9.36	12.50	10.00	8.30	9.60	8.70	18.46	21.75
Wyo.	2.18	2.50	2.25	2.10	2.00	2.40	2.40	2.10	1.90	1.90	2.30	8.34	12.50	10.30	8.60	6.70	7.50	19.59	17.25
Colo.	2.35	2.65	2.50	2.70	2.50	2.50	2.00	2.00	2.19	2.05	2.40	9.22	10.80	9.30	8.70	10.00	7.40	19.50	17.76
N. Mex.	2.35	2.70	2.50	2.05	2.00	2.60	2.10	2.60	2.33	2.08	2.50	10.82	11.50	13.00	8.50	12.10	9.30	25.23	23.25
Ariz.	3.32	3.75	3.50	2.90	3.20	3.30	2.10	3.86	3.40	4.00	3.20	12.02	13.00	12.00	12.00	11.00	8.80	37.32	28.16
Utah	2.81	3.25	4.00	2.10	2.50	2.90	3.00	2.50	2.78	2.33	2.75	8.04	9.00	9.00	8.00	9.10	7.70	22.82	21.18
Nev.	2.69	2.50	1.50	1.75	2.00	2.35	3.40	3.40	3.00	2.75	3.25	9.41	10.80	9.50	8.70	11.00	8.30	30.47	26.98
Idaho.	2.90	3.10	2.95	2.40	3.25	2.85	3.00	3.10	2.80	2.90	2.65	7.60	9.00	7.60	6.30	7.20	7.30	21.68	19.34
Wash.	2.27	2.65	2.38	2.10	2.25	2.10	2.10	2.40	2.20	2.30	2.20	12.04	15.70	12.00	10.10	10.90	11.00	26.65	24.20
Oreg.	2.10	2.30	2.18	2.00	2.00	2.05	2.10	2.10	2.20	2.10	2.00	9.50	12.10	9.60	8.30	9.00	9.20	20.23	18.40
Cal.	1.76	2.40	1.85	1.75	1.35	1.70	1.83	1.75	1.53	1.50	1.95	11.44	9.60	10.90	13.70	13.50	8.20	18.77	15.99
U.S.	1.40	1.54	1.35	1.45	1.52	1.42	1.33	1.14	1.47	1.31	1.43	11.24	12.26	14.64	11.79	12.43	11.12	16.44	15.85

[1] Based upon farm price Dec. 1.

HAY—Continued.

TABLE 80.—*Hay: Farm price per ton on first of each month, by geographical divisions, 1913 and 1914.*

Month.	United States.		North Atlantic States.		South Atlantic States.		N. Central States east of Miss. R.		N. Central States west of Miss. R.		South Central States.		Far Western States.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
January	12.42	11.86	15.46	15.30	16.05	15.06	12.68	12.25	9.68	8.78	14.51	13.01	10.32	10.30
February	12.41	11.64	15.34	15.13	15.91	15.35	12.30	11.77	9.51	8.56	15.09	12.88	10.73	10.15
March	12.37	11.34	15.20	14.73	16.51	14.87	12.06	11.32	9.58	8.19	15.24	13.09	10.68	10.11
April	12.20	11.15	15.20	14.09	16.64	14.78	12.01	10.86	9.58	8.28	15.38	13.07	9.97	10.27
May	12.32	11.13	15.52	14.12	16.66	14.96	12.40	10.53	9.77	8.18	15.53	12.81	9.68	10.63
June	12.34	11.30	15.54	14.39	16.55	15.18	12.50	11.00	9.98	8.19	15.44	13.22	9.43	10.49
July	12.01	11.19	15.49	14.55	16.96	14.50	12.27	10.94	9.41	8.26	14.42	12.56	8.96	10.12
August	11.52	11.16	14.85	14.53	16.91	14.07	12.16	10.85	8.85	8.43	14.44	12.62	8.11	10.02
September	11.91	11.89	15.43	14.57	17.13	14.58	12.82	11.81	9.04	9.82	14.62	13.97	8.32	9.79
October	11.77	12.22	15.06	15.40	16.91	15.25	12.86	12.46	9.07	10.18	14.12	13.95	8.21	9.85
November	11.57	12.26	14.83	14.96	16.76	15.48	12.40	12.64	8.82	10.24	13.80	14.53	8.30	9.97
December	11.12	12.43	15.18	15.59	16.71	15.93	12.05	12.78	8.80	9.64	13.09	14.27	8.39	10.29

TABLE 81.—*Hay: Wholesale price (baled) per ton, 1900–1914.*

Date.	Chicago.		Cincinnati.		St. Louis.		New York.	
	No. 1 timothy.		No. 1 timothy.		No. 1 timothy.		No. 1 timothy.[1]	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1900	$10.00	$14.00	$11.50	$15.00	$9.75	$14.50	$0.87½	$0.97½
1901	11.50	15.00	11.50	15.50	11.50	17.50	.87½	1.00
1902	10.00	17.50	11.00	16.50	9.50	16.00	17.00	22.00
1903	10.00	15.00	11.50	19.50	9.50	25.00	16.00	26.00
1904	9.00	15.00	11.00	15.50	10.00	13.50	15.00	19.00
1905	10.00	12.50	10.00	13.50	9.00	15.50	14.00	19.00
1906	9.50	18.00	11.00	19.50	11.00	20.00	15.00	23.00
1907	13.00	21.50	14.00	22.75	14.00	24.00	1.00	1.25
1908	10.00	14.00	11.50	16.50	10.00	18.00	14.00	21.00
1909	11.00	17.00	12.00	17.25	11.50	18.50	15.50	21.00
1910	12.50	21.00	17.00	22.50	15.00	20.50	21.00	28.00
1911	15.00	25.00	18.00	26.50	14.50	29.00	20.50	30.00
1912	13.00	28.00	15.50	31.00	13.00	31.00	21.50	32.00
1913	13.00	19.50	14.00	21.00	12.00	24.00	19.50	23.00
1914.								
January	13.50	17.50	17.75	20.00	15.00	20.50	20.50	22.00
February	13.50	16.00	17.50	19.00	15.50	21.00	19.50	21.50
March	14.50	16.00	18.00	18.75	16.00	22.00	20.50	21.50
April	15.00	17.00	18.50	20.00	18.00	23.00	20.00	23.00
May	15.00	17.50	18.50	21.00	18.50	22.50	21.00	22.50
June	14.50	16.00	18.50	20.25	17.50	22.50	20.50	22.00
July	14.50	18.00	18.50	21.50	16.00	22.50	20.50	23.50
August	14.50	18.50	18.00	21.50	14.50	22.50	21.50	25.00
September	13.00	16.50	17.50	19.00	17.00	20.50	20.00	22.00
October	14.00	16.50	17.50	19.00	17.00	20.50	18.50	21.50
November	15.00	16.00	17.50	20.00	16.00	21.00	20.00	24.00
December	15.00	16.00	18.00	19.50	17.00	20.00	18.50	22.00
Year	13.00	18.50	17.50	21.50	14.50	23.00	18.50	25.00

[1] Per hundred pounds, 1900, 1901, and 1907.

CLOVER AND TIMOTHY SEED.

TABLE 82.—*Clover and timothy seed: Wholesale price, 1900–1914.*

Date.	Clover (bushels of 60 pounds).								Timothy.							
	Cincinnati.		Chicago.		Toledo.		Detroit.		Cincinnati.		Chicago.		Milwaukee.		St. Louis.	
	Prime.		Poor to prime.[1]		Poor to choice.[2]				Per bushel (of 45 pounds).		Poor to choice (per 100 pounds).[3]		Per 100 pounds.		Poor to prime (per 100 pounds).	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1900	$4.00	$6.00	$2.40	$6.30	$4.95	$7.85	$4.80	$7.10	$1.03	$2.00	$2.32½	$4.65	$1.90	$4.50	.....	.....
1901	*4.50*	*6.60*	*2.40*	*6.90*	*5.15*	*7.40*	*5.15*	*7.35*	*1.70*	*2.90*	*3.35*	*6.55*	*3.00*	*6.25*	.....	.....
1902	*4.11*	*5.76*	*2.40*	*6.81*	*3.90*	*7.10*	*4.90*	*6.10*	*1.98*	*3.96*	*2.00*	*7.35*	*2.50*	*6.75*	$2.40	$6.40
1903	6.00	7.10	2.40	7.50	3.05	7.70	6.45	7.50	1.20	1.70	1.75	4.35	2.00	3.75	2.00	3.60
1904	4.80	7.50	3.60	7.80	2.50	7.95	6.20	7.95	1.15	1.35	1.75	3.25	2.00	3.15	2.00	2.80
1905	5.70	7.75	4.80	8.64	3.00	8.85	6.30	8.75	1.15	1.60	1.50	3.75	2.25	3.50	2.00	3.70
1906	4.50	7.50	3.90	8.49	3.00	8.72½	6.25	8.70	1.30	1.85	2.00	4.50	2.40	4.25	2.40	4.00
1907	7.00	8.50	4.80	10.20	3.00	11.00	8.00	10.75	1.50	2.25	3.00	4.75	3.25	4.65	3.00	4.60
1908	4.00	11.00	3.60	14.40	3.90	13.55	4.60	13.00	1.35	2.15	3.25	4.85	2.50	4.60	2.00	4.50
1909	*4.00*	*8.50*	*4.20*	*9.00*	*5.17½*	*9.55*	*5.20*	*9.25*	*1.30*	*1.65*	*2.50*	*4.00*	*2.50*	*3.80*	*1.50*	*3.70*
1910	5.49	8.49	6.50	17.00	2.40	10.30	6.40	10.00	1.30	4.25	2.50	9.75	2.75	9.50	2.50	9.50
1911	7.00	11.00	4.80	12.45	3.00	12.80	8.60	12.50	3.50	6.90	7.00	16.25	8.00	15.50	5.00	15.75
1912	9.00	13.00	4.80	13.35	3.00	14.20	10.25	14.00	1.50	6.50	3.80	16.25	2.50	15.50	2.75	15.60
1913	5.00	11.50	4.20	13.20	1.60	13.85	7.50	13.40	1.50	2.25	2.50	5.90	2.50	5.50	2.00	5.50
1914.																
January	7.00	9.00	7.00	15.00	3.50	9.45	8.70	9.40	1.80	2.25	3.50	5.55	3.50	5.50	3.00	5.35
February	7.30	8.25	9.00	14.50	3.55	9.02½	8.25	8.90	1.60	2.15	3.25	5.50	3.50	5.00	3.25	4.75
March	7.25	8.25	8.00	14.00	3.60	8.75	8.15	8.60	1.50	2.10	3.00	5.50	3.00	5.00	2.50	4.45
April	*6.00*	*8.10*	*8.00*	*13.00*	*2.00*	*8.02½*	*7.40*	*8.00*	*1.50*	*2.00*	*3.60*	*5.40*	*3.00*	*4.50*	*2.00*	*4.27*
May	5.50	7.00	8.00	13.00	2.40	7.85	7.60	7.75	1.50	2.00	3.00	5.50	3.00	4.50	3.25	5.00
June	5.00	6.50	8.00	13.50	3.00	8.50	7.80	8.30	1.40	2.00	3.25	5.75	3.00	5.00	4.00	5.35
July	5.00	7.00	9.00	15.00	3.60	9.40	8.20	9.25	1.40	2.25	4.00	6.75	3.50	5.00	5.00	6.00
August	6.00	9.00	10.00	18.50	2.40	11.40	9.40	11.25	1.60	2.60	4.00	6.50	4.00	5.75	3.25	6.75
September	7.00	9.25	9.25	17.75	3.60	11.15	9.10	10.85	2.00	2.60	4.00	6.50	3.75	5.75	3.75	6.05
October	7.00	8.50	9.50	15.40	3.60	9.40	8.75	9.25	2.00	2.25	3.60	5.60	3.75	5.00	4.15	5.70
November	7.00	8.50	9.50	15.00	3.60	9.32½	8.90	9.25	1.90	2.25	3.50	5.90	4.00	5.05	3.50	5.25
December	7.25	8.30	9.00	15.85	3.00	9.70	9.10	9.60	1.90	2.70	4.25	7.85	4.75	7.00	4.25	7.00
Year	5.00	9.25	7.00	18.50	2.00	11.40	7.40	11.25	1.40	2.70	3.00	7.85	3.00	7.00	2.00	7.00

[1] Poor to choice to 1905.
[2] Prime, 1901 to 1907.
[3] Prime, 1902 to 1904; poor to prime 1905–1906.

COTTON.

TABLE 83.—*Cotton: Area and production of undermentioned countries, 1911–1913.*

[Bales of 478 pounds net.]

Country.	Area.			Production.		
	1911	1912	1913	1911	1912	1913
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bales.*	*Bales.*	*Bales.*
United States:						
Contiguous [1]	36,045,000	34,283,000	37,089,000	15,692,701	13,703,421	14,156,486
Noncontiguous—Porto Rico [1]	(2)	(2)	(2)	412	447	633
Total United States (except Philippine Islands)				15,693,113	13,703,868	14,157,119
Mexico [3]	(2)	(2)	(2)	200,000	200,000	200,000
West Indies:						
British—						
Bahamas	(2)	(2)	(2)	[4] 27	[4] 28	[4] 28
Barbados	4,741	4,609		1,520	953	888
Grenada	(2)	(2)	(2)	[4] 574	[4] 796	[4] 838
Jamaica	(2)	(2)	(2)	[4] 37	[4] 76	[4] 146
Leeward Islands	(2)	(2)	(2)	3,088	2,271	[4] 2,561
St. Lucia	(2)	(2)	(2)	[4] 8	[4] 7	[4] 8
St. Vincent	3,587	6,105	5,444	[5] 1,175	[4] 1,117	[4] 1,018
Trinidad and Tobago	(2)	(2)	(2)	13	28	[4] 15
Danish	(2)	(2)	(2)	548	276	745
French—Guadeloupe	(2)	(2)	(2)	8	8	8
Haiti	(2)	(2)	(2)	8,783	9,077	8,970
Total				15,908,804	13,918,505	14,372,343
SOUTH AMERICA.						
Argentina	4,690	4,458	6,919	3,939	3,744	5,811
Brazil [3]	(2)	(2)	(2)	277,000	277,000	277,000
Chile [3]	(2)	(2)	334	(2)	(2)	740
Ecuador	(2)	(2)	(2)	[4] 258	[4] 254	255
Peru	(2)	(2)	(2)	[4] 73,274	[4] 88,604	[4] 110,314
Total				354,471	369,602	394,120
EUROPE.						
Bulgaria	1,871	1,730	1,730	917	646	550
Greece [3]	(2)	12,355	(2)	24,000	24,000	24,000
Italy [3]	(2)	(2)	(2)	2,700	2,700	2,700
Malta	1,100	1,144		392	512	567
Total				28,009	27,858	27,917
ASIA.						
British India,[6] including native States [6]	22,596,000	21,615,000	22,028,000	3,224,268	2,751,464	3,857,741
Ceylon [7]	(2)	(2)	(2)	[4] 716	[4] 1,490	[4] 500
Chosen (Korea)	124,742	(2)	(2)	23,470	34,591	(2)
Cyprus	(2)	(2)	(2)	[4] 7,230	7,632	9,655
Dutch East Indies	(2)	(2)	(2)	11,902	17,000	(2)
French Indo-China	(2)	(2)	(2)	8,709	14,459	(2)
Japan	6,862	6,759	4,942	4,215	5,057	(2)
Persia [4]	(2)	(2)	(2)	85,878	128,709	(2)
Philippine Islands [8]	7,544	7,544	7,544	6,098	6,098	6,098

[1] "Linters" not included. Quantity of linters produced: 557,575 bales in 1911, 609,594 in 1912, 638,881 in 1913. For Porto Rico the data refer to exports to foreign countries plus shipments to the United States.
[2] No official data.
[3] Consular report.
[4] Exports.
[5] Sea-island cotton only.
[6] Year ending September 30.
[7] Mostly Kapoc.
[8] Census, 1902.

COTTON—Continued.

TABLE 83.—*Cotton: Area and production of undermentioned countries, 1911–1913*—Con.

[Bales of 478 pounds net.]

Country.	Area.			Production.		
	1911	1912	1913	1911	1912	1913
ASIA—continued.						
Russia (Asiatic):	*Acres.*	*Acres.*	*Acres.*	*Bales.*	*Bales.*	*Bales.*
Central Asia	864,123	1,085,158	1,141,233	455,742	596,468	657,713
Transcaucasia	194,808	241,267	231,267	66,340	70,848	73,543
Total, Russia (Asiatic)	1,058,931	1,326,425	1,372,500	522,082	667,316	731,256
Siam	(1)	(1)	(1)	....	1,454	4,686
Total	....	....	....	....	3,635,270	....
AFRICA.						
British Africa:						
Nyasaland Protectorate	23,314	24,155	(1)	[2] 2,845	[2] 6,773	[2] 5,023
East Africa	(1)	(1)	(1)	347	910	[2] 282
Gold coast	(1)	(1)	(1)	[2] 20	[2] 43	[2] 58
Nigeria	(1)	(1)	(1)	[2] 4,682	[2] 9,148	[2] 13,308
Uganda	(1)	(1)	(1)	[2] 17,456	[2] 22,003	[2] 23,414
Union of South Africa	(1)	(1)	(1)	[2] 74	[2] 67	[2] 68
Total British Africa	....	....	....	25,424	38,944	42,153
Egypt	1,776,298	1,787,274	1,788,602	1,514,730	1,554,100	1,565,290
French Africa:						
Algeria	2,243	1,045	(1)	761	830	825
Dahomey	(1)	(1)	(1)	623	577	809
Madagascar	(1)	(1)	(1)	13	25	28
Senegal	(1)	(1)	(1)	69	92	36
Upper Senegal and Niger	(1)	(1)	(1)	277	461	455
Somali Coast	(1)	(1)	(1)	[2] 5	[2] 1	[2] 1
Total French Africa	....	....	....	1,748	1,986	2,154
German Africa:						
East Africa	35,517	35,770	....	4,983	8,678	10,109
Kamerun	(1)	(1)	(1)	2	5	5
Togo	(1)	(1)	(1)	2,387	2,541	2,322
Total German Africa	....	....	....	7,372	11,224	12,436
Italian Africa—Eritrea	(1)	(1)	(1)	1,307	1,247	(1)
Belgian Kongo	....	....	....	....	....	....
Portuguese Africa:						
Angola	(1)	(1)	(1)	509	(1)	(1)
East Africa	(1)	(1)	(1)	21	(1)	(1)
Total Portuguese Africa	....	....	....	530	....	....
Sudan (Anglo-Egyptian)	(1)	(1)	(1)	17,392	12,128	10,737
Total	....	....	....	1,568,503	....	....
OCEANIA.						
British:						
Queensland	605	441	....	130	105	25
Fiji Islands	16	7	(1)	....	3	5
Total British Oceania	....	....	....	130	108	30
French:						
New Caledonia	(1)	(1)	2,500	209	925	1,109
Tahiti	(1)	(1)	(1)	32	69	73
Total French Oceania	....	....	....	241	994	1,182
Total Oceania	....	....	....	371	1,102	1,212

[1] No official data. [2] Exports.

COTTON—Continued.

Table 84.—*Cotton: Total production of countries named in Table 83, 1900–1915*

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Bales.[1]		*Bales.*[1]		*Bales.*[1]		*Bales.*[1]
1900	15,893,591	1904	21,005,175	1908	3,688,292	1911	....
1901	15,926,048	1905	18,342,075	1909	20,679,334	1912	....
1902	17,331,503	1906	22,183,148	1910	22,433,269	1913	....
1903	17,278,881	1907	18,328,613				

[1] Bales of 478 pounds, net.

Table 85.—*Cotton: Acreage harvested, by States, 1905–1914.*

[Thousand acres.]

State.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914[1]
Virginia	35	36	23	28	25	33	13	17	47	45
North Carolina	1,230	1,374	1,408	1,458	1,359	1,478	1,621	1,[illegible]	1,576	1,600
South Carolina	2,340	2,389	2,485	2,545	2,492	2,634	2,800	2,695	2,790	2,860
Georgia	4,020	4,610	4,566	4,848	4,674	4,873	5,504	5,335	5,318	5,375
Florida	230	283	209	265	237	257	308	224	188	195
Alabama	3,425	3,659	3,148	3,591	3,471	3,560	4,017	3,730	3,760	122
Mississippi	3,019	3,408	3,084	3,395	3,291	3,317	3,340	2,889	3,067	800
Louisiana	1,445	1,740	1,540	1,556	930	975	1,075	929	1,244	3,875
Texas	7,432	8,894	8,478	9,316	9,660	10,060	10,943	11,338	12,597	3,120
Arkansas	1,723	2,098	1,902	2,296	2,218	2,238	2,363	1,991	2,502	1,360
Tennessee	629	814	693	754	735	765	837	783	865	11,930
Missouri	70	91	63	87	79	100	129	103	112	2,825
Oklahoma	1,509	1,982	2,064	2,311	1,767	2,204	3,050	2,665	3,009	2,525
California	......	......	......	......	......	9	12	9	14	35
United States	27,107	31,378	29,660	32,444	30,938	32,403	36,045	34,283	37,089	36,697

[1] Preliminary estimate.

Table 86.—*Cotton: Production of lint (excluding linters) in 500-pound gross weight bales, by States, and total value of crop, 1905 to 1914.*

[Thousand bales. As finally reported by U. S. Bureau of the Census.]

State.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
Virginia	15	14	9	12	10	15	30	24	23	25
North Carolina	619	570	605	647	601	706	1,076	866	793	925
South Carolina	1,078	876	1,119	1,171	1,100	1,164	1,649	1,182	1,378	1,525
Georgia	1,682	1,593	1,816	1,931	1,804	1,767	2,768	1,777	2,317	2,713
Florida	69	56	50	62	54	59	83	53	59	81
Alabama	1,239	1,262	1,113	1,346	1,024	1,194	1,716	1,342	1,495	1,750
Mississippi	1,199	1,531	1,468	1,656	1,083	1,263	1,204	1,046	1,311	1,245
Louisiana	513	988	676	470	253	246	385	376	444	448
Texas	2,542	4,174	2,300	3,815	2,523	3,049	4,256	4,880	3,945	4,585
Arkansas	619	941	775	1,033	714	821	939	792	1,073	1,016
Tennessee	279	306	275	344	247	332	450	277	379	382
Missouri	43	54	36	62	45	60	97	56	67	82
Oklahoma	677	898	862	691	545	923	1,022	1,021	840	1,261
All other	1	2	3	2	2	10	17	11	32	64
United States	10,575	13,274	11,107	13,242	10,005	11,609	15,693	13,703	14,156	16,102
Total value of crop	$556,830	$640,310	$613,630	$588,810	$688,350	$820,320	$732,420	$792,240	$887,160	....

COTTON—Continued.

TABLE 87.—*Cotton: Condition of crop, United States, monthly, 1893–1914.*

[Prior to 1901 figures of condition relate to first of month following dates indicated.]

Year.	May 25.	June 25.	July 25.	Aug. 25.	Sept. 25.	Year.	May 25.	June 25.	July 25.	Aug. 25.	Sept. 25.
	P.ct.	*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*		*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*
1893	85.6	82.7	80.4	73.4	70.7	1904	83.0	88.0	91.6	84.1	75.8
1894	88.3	89.6	91.8	85.9	82.7	1905	77.2	77.0	74.9	72.1	71.2
1895	81.0	82.3	77.9	70.8	65.1	1906	84.6	83.3	82.9	77.3	71.6
1896	97.2	92.5	80.1	64.2	60.7	1907	70.5	72.0	75.0	72.7	67.7
1897	83.5	86.0	86.9	78.3	70.0	1908	79.7	81.2	83.0	76.1	69.7
1898	89.0	91.2	91.2	79.8	75.4	1909	81.1	74.6	71.9	63.7	58.5
1899	85.7	87.8	84.0	68.5	62.4	1910	82.0	80.7	75.5	72.1	65.9
1900	*82.5*	*75.8*	*76.0*	*68.2*	*67.0*	*1911*	*87.8*	*88.2*	*89.1*	*73.2*	*71.1*
1901	81.5	81.1	77.2	71.4	61.4	1911	78.9	80.4	76.5	74.8	69.6
1902	*95.1*	*84.7*	*81.0*	*64.0*	*58.3*	*1913*	*79.1*	*81.8*	*79.6*	*68.2*	*64.1*
1903	74.1	77.1	79.7	81.2	65.1	1914	74.3	79.6	76.4	78.0	73.5

TABLE 88.—*Cotton: Yield per acre, price per pound Dec. 1, and value per acre, by States.*

State.	Yield per acre (pounds of lint).											Farm price per pound (cents).						Value per acre (dollars).[1]	
	10-year average, 1905–1914.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914 (2)	10-year average, 1905–1914.	1910	1911	1912	1913	1914	5-year average, 1910–1914.	1914
Va.	226	204	185	190	210	190	212	330	250	240	254	10.8	13.8	9.0	12.0	13.1	7.3	11.0	18.54
N. C.	240	240	201	205	211	210	227	315	267	239	283	10.8	14.1	8.8	12.2	12.6	6.9	10.9	19.53
S. C.	224	220	175	215	219	210	216	280	209	235	256	10.9	14.2	8.8	12.4	12.7	6.9	11.0	17.66
Ga.	194	200	165	190	190	184	173	240	159	208	236	10.9	14.2	8.9	12.4	12.8	6.9	11.0	16.28
Fla.	126	144	85	115	112	110	110	130	113	150	185	15.4	21.0	12.0	15.7	17.0	12.2	15.6	22.57
Mo.	295	294	285	275	340	271	285	360	260	286	295	10.4	13.0	8.8	11.3	11.5	6.5	10.2	19.18
Tenn.	200	212	180	190	218	158	207	257	169	210	196	10.7	14.1	8.8	12.4	12.7	6.4	10.9	12.54
Ala.	176	173	165	169	179	142	160	204	172	190	209	10.8	14.2	8.8	12.1	12.7	6.7	10.9	14.00
Miss.	195	190	215	228	233	157	182	172	173	204	196	11.0	14.4	9.2	12.3	12.6	6.8	11.1	13.33
La.	174	170	272	210	145	130	120	170	193	170	162	10.7	14.4	8.9	11.5	11.7	6.9	10.7	11.18
Tex.	171	164	225	130	196	125	145	186	206	150	183	10.5	14.0	8.6	11.5	11.5	6.8	10.5	12.44
Okla.	181	215	217	200	143	147	200	160	183	132	212	10.1	13.3	8.0	11.3	11.4	6.5	10.1	13.78
Ark.	191	172	216	195	215	153	175	190	190	205	197	10.8	14.4	8.9	12.3	11.6	6.6	10.8	13.00
Cal.	436	.....	.....	.....	.....	.....	335	390	450	500	506	10.7	13.3	7.5	12.5	13.0	7.0	10.7	35.42
U. S.	187.5	186.1	202.5	178.3	194.9	154.3	170.7	207.7	190.9	182.0	207.9	10.7	14.1	8.8	11.9	12.2	6.8	10.8	14.15

[1] Based upon farm price Dec. 1.

[2] Preliminary.

COTTON—Continued.

TABLE 89.—*Cotton: Farm price per pound on first of each month, by geographical divisions, 1913 and 1914.*

Month.	United States.		South Atlantic States.		N. Cent. States west of Miss. R.		South Central States.		Far Western States.	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
January	11.7	12.2	12.1	12.6	....	11.0	11.5	12.1	....	....
February	11.9	11.9	12.7	12.1	12.1	12.0	11.6	11.8	....	....
March	12.6	11.8	14.0	11.9	11.6	9.0	11.5	11.7	....	12.0
April	11.9	11.8	12.7	12.0	11.6	9.5	11.5	11.8	....	12.5
May	12.2	11.6	12.8	11.6	11.5	9.5	11.8	11.6	....	....
June	12.4	11.5	13.2	11.6	12.0	9.0	12.0	11.4	....	....
July	12.4	11.6	13.1	11.9	12.0	9.3	12.1	11.5	....	....
August	12.4	11.5	12.9	11.8	12.1	9.1	12.2	11.4	....	....
September	8.7	11.8	8.5	11.8	8.0	11.5	8.8	11.8	....	....
October	7.8	13.3	8.0	13.3	....	13.0	7.7	13.3	7.5	....
November	6.3	13.0	6.5	13.5	6.2	11.5	6.2	12.8	10.0	....
December	6.8	12.2	6.0	12.8	6.5	11.5	6.7	11.9	7.0	13.0

TABLE 90.—*Cotton: Closing price of middling upland per pound, 1900–1914.*

Date.	New York.		New Orleans.		Memphis.		Galveston.		Savannah.		Charleston.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
1900	7¼	11	7¾	11⅛	7⅜	11	7¼	10	7 7/16	10⅜	7¼	10⅜
1901	7	12	7¼	9 11/16	7⅛	9⅝	7⅜	9 11/16	7⅛	9⅜	7⅛	9⅜
1902	8 1/16	9⅝	7⅝	9¾	7	9¼	7¾	9⅝	7 9/16	9 5/16	7 9/16	9⅝
1903	8.85	14.10	8 7/16	13⅝	8½	13½	8⅝	13⅜	8⅜	13⅜	8¼	13½
1904	6.85	17.25	6½	16 7/16	6¾	16½	6⅝	16	6½	16¼	6¼	16
1905	7.00	12.60	6⅝	12 1/16	6¾	12⅛	6¾	12	6⅝	11 13/16	6⅝	11 9/16
1906	9.60	12.25	9⅜	11 11/16	9⅜	11 11/16	9¼	11 9/16	8⅞	11¾	8¾	11⅝
1907	10.60	13.55	10¼	13 9/16	10¼	13¼	10½	13 9/16	9¾	13 5/16	9¾	13
1908	9.00	12.25	8 11/16	12½	8¾	12⅝	8¾	12¼	8¼	11⅝	8½	11⅝
1909	9.25	16.15	8⅞	15¼	9	15⅝	9	15¾	8 11/16	15⅞	8¾	15 5/16
1910	13.60	19.75	13¼	15¾	13½	15¼	12⅞	15⅛	13 5/16	15⅝	13	15⅝
1911	9.20	16.15	9 1/16	15 11/16	9¼	15 7/16	9¼	15⅝	8⅝	15⅜	8¾	15⅝
1912	9.35	13.40	9 1/16	13¼	9 7/16	13¼	9⅜	13 5/16	8⅝	12¾	8¾	12⅝
1913	11.70	14.50	11⅛	14	11¾	13¾	11¾	14¼	11½	14⅛	11¼	13⅝
1914.												
January	12.30	13.05	12⅝	13 1/16	13⅛	13⅜	12¾	13 1/16	12⅜	13¼	12¼	13¼
February	12.55	13.05	12 11/16	13	13	13¼	12¾	12⅞	12¾	13	12¼	12¾
March	13.00	13.75	12¾	13 5/16	13	13¼	12¾	13 5/16	12¾	13⅛	12⅝	13
April	13.00	13.50	13	13 7/16	13⅛	13¼	12 11/16	13⅛	13¼	13¼	13	13¼
May	12.90	14.50	13	13¾	13⅛	13¾	13	14	13¼	13½	13	13¾
June	13.25	13.75	13 9/16	13 11/16	13¾	13¾	13 11/16	14	12⅞	13⅞	13½	13¾
July	12.50	13.25	13 1/16	13 5/16	13	13¾	13⅛	13⅝	13⅞	13⅞	....	....
August	[1]11.00	[1]11.00	(2)	(2)	13	13	....	....	7½	8½	....	....
September	....	....	8 1/16	8⅜	8	8½	8	8¾	7½	8⅝	7½	8½
October	....	....	6½	8 1/16	6½	8	6⅝	8	6½	7½	6½	7⅜
November	7.50	7.75	7 1/16	7¾	6¾	7¼	7⅝	8	7⅜	7½	7	7⅝
December	7.25	7.80	7	7½	7	7¼	7¼	8¼	6⅞	7⅞	6¾	7¾
Year	7.25	14.50	6½	13 11/16	6½	13⅞	6⅝	14	6½	13⅞	6½	13½

[1] Not based on actual sale; exchange closed.

[2] No market.

COTTON—Continued.

TABLE 91.—*Cotton: International trade, calendar years 1911–1913.*

[Expressed in bales of 500 pounds gross weight, or 478 pounds net. The figures for cotton refer to ginned and unginned cotton and linters, but not to mill waste, cotton batting, *scarto* (Egypt and Sudan). Wherever unginned cotton has been separately stated in the original reports it has been reduced to ginned cotton in this statement at the ratio of 3 pounds unginned to 1 pound ginned. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.)	Country.	1911	1912	1913 (prelim.)
	Bales.	*Bales.*	*Bales.*		*Bales.*	*Bales.*	*Bales.*
Belgium	255	242	298	Netherlands	137	163	150
Brazil	68	77	173	Persia[1]	86	129	129
British India	1,742	1,689	2,223	Peru	73	89	110
China	245	225	206	United States	8,920	11,663	9,376
Egypt	1,373	1,721	1,445	Other countries	151	196	202
France	305	325	281				
Germany	186	247	243	Total	13,541	16,766	14,836

IMPORTS.

Country.	1911	1912	1913 (prelim.)	Country.	1911	1912	1913 (prelim.)
Austria-Hungary	907	1,021	953	Russia	935	830	753
Belgium	583	652	647	Spain	417	428	407
Canada	157	165	166	Sweden	92	100	100
France	1,469	1,597	1,518	Switzerland	113	121	126
Germany	2,180	2,502	2,404	United Kingdom	4,008	5,193	4,010
Italy	876	987	931	United States	212	270	220
Japan	1,125	1,655	1,655	Other countries	308	357	313
Mexico	6	18	18				
Netherlands	270	324	317	Total	13,[illegible]	16,220	14,573

[1] Year beginning Mar. 21.

COTTONSEED OIL.

TABLE 92.—*Cottonseed oil: International trade, calendar years 1911–1913.*

[See "General note," p. 517.]

EXPORTS.

[000 omitted.]

Country	1911	1912	1913 (prelim.)	Country.	1911	1912	1913 (prelim.)
	Gallons.	*Gallons.*	*Gallons.*		*Gallons.*	*Gallons.*	*Gallons.*
Belgium	1,042	1,341	1,014	United States	43,004	47,457	35,304
Egypt	488	359	619	Other countries	6	40	57
France	177	172	295				
Netherlands	43	40	31	Total	51,542	55,508	44,946
United Kingdom	6,782	6,099	7,626				

IMPORTS.

Country	1911	1912	1913 (prelim.)	Country.	1911	1912	1913 (prelim.)
Algeria	128	118	118	Mexico	673	4,310	4,310
Australia	119	182	175	Netherlands	3,544	7,048	7,765
Austria-Hungary	15	127	118	Norway	1,492	1,554	1,510
Belgium	2,337	2,876	2,005	Roumania	805	805	805
Brazil	[1]670	[1]670	440	Senegal	464	382	382
Canada	1,830	2,911	4,104	Servia[3]	396	396	396
Egypt	186	345	118	Sweden	680	865	865
France	2,609	3,697	2,726	United Kingdom	7,361	7,587	4,990
Germany	6,391	7,900	4,786	Uruguay[4]	363	363	363
Italy	3,599	5,388	3,957	Other countries	4,146	4,306	6,291
Malta[2]	261	261	278				
Martinique	275	262	262	Total	38,364	52,373	46,784

[1] Data for 1909.
[2] Year beginning Apr. 1.
[3] Data for 1911.
[4] Year beginning July 1. Data for 1910.

TOBACCO.

TABLE 93.—*Tobacco: Area and production of undermentioned countries, 1911–1913.*

Country.	Area.			Production.		
	1911	1912	1913	1911	1912	1913
NORTH AMERICA.						
United States:	*Acres.*	*Acres.*	*Acres.*	*Pounds.*	*Pounds.*	*Pounds.*
Contiguous	1,013,000	1,226,000	1,216,000	905,109,000	962,855,000	953,734,000
Noncontiguous—						
Porto Rico	(1)	17,175	17,808	10,000,000	16,500,000	17,000,000
Total United States (except Philippine Islands)	....	1,243,175	1,233,808	915,109,000	979,355,000	970,734,000
Canada:						
Ontario	[2] 7,000	[2] 7,000	6,000	12,000,000	7,500,000	8,000,000
Quebec	[2] 12,000	[2] 12,000	5,000	6,000,000	5,500,000	4,500,000
Total Canada	[2] 19,000	[2] 19,000	11,000	18,000,000	13,000,000	12,500,000
Cuba	(1)	(1)	(1)	66,930,000	42,634,000	72,585,000
Guatemala	(1)	(1)	1,230	250,000	200,000	258,671
Jamaica	901	804	969	494,561	442,000	533,000
Mexico	(1)	(1)	(1)	34,711,000	34,711,000	34,711,000
Santo Domingo	(1)	(1)	(1)	28,000,000	18,000,000	28,000,000
Total	....	....	....	1,063,494,561	1,087,798,000	1,119,821,071
SOUTH AMERICA.						
Argentina	24,231	24,137	23,960	32,427,461	42,301,799	31,931,426
Brazil [4]	(1)	(1)	(1)	40,761,118	54,465,930	64,798,421
Chile	84	2,478	3,430	150,133	5,077,414	8,523,645
Uruguay	1,490	3,963	4,497	1,093,731	4,373,508	4,801,361
Total	....	....	....	74,432,443	96,218,651	110,044,853
EUROPE.						
Austria-Hungary:						
Austria	10,022	8,456	8,263	11,882,574	12,480,279	13,692,771
Hungary	(1)	119,914	111,731	139,583,367	169,302,477	146,428,871
Bosnia-Herzegovina [4]	(1)	(1)	(1)	6,614,000	6,398,000	13,227,600
Total Austria-Hungary	....	....	....	158,079,941	188,180,756	173,349,242
Belgium	10,546	9,926	9,941	18,695,008	22,109,402	19,702,290
Bulgaria	29,956	26,193	17,297	23,473,038	17,636,800	13,227,600
Denmark	....	524	....	237,938	258,000	258,000
France	39,380	38,145	25,474	40,433,246	49,883,925	35,703,021
Germany	42,049	38,981	34,996	64,332,190	85,661,744	58,952,951
Italy	20,626	19,053	21,004	22,417,000	20,960,000	18,739,000
Netherlands	991	1,023	1,149	1,799,915	1,858,269	....
Roumania	24,690	22,941	27,122	20,509,394	13,145,809	20,941,275
Russia (European)	170,648	149,123	124,659	247,147,083	237,405,092	229,945,071
Servia	5,201	5,167	(1)	3,727,097	3,276,917	3,000,000
Sweden	(1)	741	(1)	1,505,226	1,300,714	1,047,090
Switzerland	717	791	791	1,232,371	1,212,530	1,327,169
Total	....	....	....	603,609,474	642,890,645	578,939,619
ASIA.						
British India	1,115,016	1,048,817	(1)	450,000,000	450,000,000	450,000,000
British North Borneo [3]	(1)	(1)	(1)	2,649,000	2,844,000	2,500,000
China: Hu-nan and Kiang-si	....	....	....	....	....	....
Dutch East Indies:						
Java [3]	421,484	460,710	(1)	117,741,000	134,143,000	135,000,000
Sumatra, East Coast of	(1)	(1)	(1)	46,492,000	48,284,000	45,024,000
Total Dutch East Indies	....	....	....	164,233,000	182,427,000	180,024,000

[1] No official data.
[2] Census of 1911 giving crops of 1910.
[3] Exports.
[4] Unofficial estimate.

TOBACCO—Continued.

TABLE 93.—*Tobacco: Area and production of undermentioned countries, 1911–1913*—Con.

Country.	Area.			Production.		
	1911	1912	1913	1911	1912	1913
ASIA—continued.	*Acres.*	*Acres.*	*Acres.*	*Pounds.*	*Pounds.*	*Pounds.*
Formosa	982	918	(1)	1,093,190	990,126	1,000,000
Japan	68,023	71,998	77,172	74,896,240	96,095,176	111,436,405
Philippine Islands	....	140,948	170,477	56,257,274	65,219,654	101,544,786
Russia (Asiatic)	36,802	36,754	29,640	31,532,686	28,790,677	24,723,928
Total	....	....	....	789,661,390	826,366,653	871,223,869
AFRICA.						
Algeria	18,965	22,733	(1)	24,443,282	21,556,138	21,000,000
Nyasaland	4,507	7,411	10,496	1,048,800	3,391,360	4,159,680
Rhodesia	(1)	(1)	(1)	606,219	607,000	607,000
Union of South Africa: [2]						
Cape of Good Hope	4,411	4,411	4,411	3,767,000	3,767,000	3,767,000
Natal	1,062	1,062	1,062	2,685,000	2,685,000	2,685,000
Orange Free State	2,396	2,396	2,396	807,000	807,000	807,000
Transvaal	11,495	11,495	11,495	7,702,000	7,702,000	7,702,000
Total Union of South Africa	19,364	19,364	19,364	14,961,000	14,961,000	14,961,000
Total	....	....	....	41,959,391	40,515,498	40,727,680
OCEANIA.						
Australia:						
Queensland	655	592	[3] 693	849,408	476,560	[4] 242,704
New South Wales	1,096	1,501	1,914	953,456	1,685,040	1,552,656
Victoria	329	356	138	122,980	412,832	107,778
Total Australia	2,080	2,449	2,745	1,925,844	2,574,432	1,903,138
Fiji	200	114	(1)	58,531	29,120	30,000
Total	....	....	....	1,984,375	2,603,552	1,933,138
Grand total	....	....	....	2,566,201,544	2,696,401,370	2,722,190,036

[1] No official data. [2] Census of 1911. [3] Including Northern Territory. [4] Unofficial estimate.

TABLE 94.—*Tobacco: Total production of countries mentioned in Table 93, 1900–1913.*[1]

Year.	Production.	Year.	Production.	Year.	Production.	Year.	Production.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*
1900	2,201,193,000	1904	2,146,641,000	1908	2,382,601,000	1911	2,566,201,544
1901	2,270,213,000	1905	2,279,728,000	1909	2,742,500,000	1912	2,696,401,379
1902	2,376,054,000	1906	2,270,208,000	1910	2,833,729,000	1913	2,722,190,030
1903	2,401,268,000	1907	2,391,061,000				

[1] Data for 1911–1913 not strictly comparable with earlier years.

TOBACCO—Continued.

Table 95.—*Tobacco: Acreage, production, value, etc., in the United States 1849–1914.*

Note.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage (000 omitted).	Average yield per acre.	Production (000 omitted).	Average farm price per pound Dec. 1.	Farm value Dec. 1 (000 omitted).	Domestic exports of unmanufactured, fiscal year beginning July 1.	Imports of unmanufactured, fiscal year beginning July 1.	Condition of growing crop. July 1.	Aug. 1.	Sept. 1.	When harvested.
	Acres.	*Lbs.*	*Lbs.*	*Cts.*	*Dolls.*	*Pounds.*	*Pounds.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1849			*199,753*								
1859			*434,209*								
1869			*262,735*								
1879	*639*	*739.7*	*472,661*								
1889	*695*	*702.5*	*488,257*								
1899	*1,101*	*788.5*	*868,113*								
1900	1,046	778.0	814,345	6.6	53,661	315,787,782	26,851,253	88.5	82.9	77.5	78.1
1901	1,039	788.0	818,953	7.1	58,283	301,007,365	29,428,837	86.5	72.1	78.2	81.5
1902	1,031	797.3	821,824	7.0	57,564	368,184,084	34,016,956	85.6	81.2	81.5	84.1
1903	1,038	786.3	815,972	6.8	55,515	311,971,831	31,162,636	85.1	82.9	83.4	82.3
1904	806	819.0	660,461	8.1	53,383	334,302,091	33,288,378	85.3	83.9	83.7	85.4
1905	776	815.6	633,034	8.5	53,519	312,227,202	41,125,970	87.4	84.1	85.1	85.8
1906	796	857.2	682,429	10.0	68,233	340,742,864	40,898,807	86.7	87.2	86.2	84.4
1907	821	850.5	698,126	10.2	71,411	330,812,658	35,005,131	81.3	82.8	82.5	84.8
1908	875	820.2	718,061	10.3	74,130	287,900,946	43,123,196	86.6	85.8	84.3	84.1
1909	1,180	804.3	949,357								
1909	*1,295*	*815.3*	*1,055,765*	10.1	106,600	357,196,074	46,853,389	89.8	83.4	80.2	81.3
1910 [1]	1,366	807.7	1,103,415	9.3	102,142	355,327,072	48,203,288	85.3	78.5	77.7	80.2
1911	1,013	893.7	905,109	9.4	85,210	379,845,320	54,740,380	72.6	68.0	71.1	80.5
1912	1,226	785.5	962,855	10.8	104,063	418,796,906	67,977,118	87.7	82.8	81.1	81.8
1913	1,216	784.3	953,734	12.8	122,481	449,749,982	61,174,751	82.8	78.3	74.5	76.6
1914	1,224	845.7	1,034,679	9.8	101,411			66.0	66.5	71.4	81.8

[1] Figures adjusted to census basis.

Table 96.—*Tobacco: Acreage, production, and total farm value, by States, 1914.*

State.	Acreage.	Production.	Farm value Dec. 1.	State.	Acreage.	Production.	Farm value Dec. 1.
	Acres.	*Pounds.*	*Dollars.*		*Acres.*	*Pounds.*	*Dollars.*
New Hampshire	100	177,000	32,000	Ohio	86,800	78,120,000	6,875,000
Vermont	100	170,000	31,000	Indiana	13,500	12,150,000	1,094,000
Massachusetts	6,600	11,550,000	2,044,000	Illinois	600	468,000	56,000
Connecticut	*20,200*	*35,754,000*	*6,614,000*	Wisconsin	*45,600*	*53,808,000*	5,919,000
New York	4,600	5,980,000	718,000	Missouri	4,100	4,920,000	640,000
Pennsylvania	33,100	47,995,000	4,080,000	Kentucky	400,000	364,000,000	30,576,000
Maryland	22,000	*17,600,000*	*1,408,000*	Tennessee	*77,400*	*63,468,000*	*4,760,000*
Virginia	175,000	113,750,000	10,238,000	Alabama	200	140,000	39,000
West Virginia	10,800	8,856,000	974,000	Louisiana	700	280,000	98,000
North Carolina	265,000	172,250,000	19,809,000	Texas	200	116,000	24,000
South Carolina	*50,000*	36,500,000	3,540,000	Arkansas	700	427,000	77,000
Georgia	1,900	1,900,000	475,000				
Florida	4,300	4,300,000	1,290,000	United States	1,223,500	1,034,679,000	101,411,000

TOBACCO—Continued.

TABLE 97.—*Tobacco: Yield per acre, price per pound Dec. 1, and value per acre, by States.*

State.	Yield per acre (pounds).											Farm price per pound (cents).						Value per acre (dollars).[1]	
	10-year average, 1905–1914.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	5-year average, 1910–1914.	1910	1911	1912	1913	1914	5-year average, 1910–1914.	1914
New Hampshire	1,718	1,700	1,785	1,650	1,800	1,700	1,720	1,700	1,700	1,650	1,770	[illegible]	15.0	16.0	18.5	18.0	18.0	292.02	318.60
Vermont	1,664	1,650	1,700	1,625	1,735	1,675	1,600	1,700	1,700	1,550	1,700	15.9	14.5	16.0	18.5	18.0	18.0	280.70	306.00
Massachusetts	1,676	1,850	1,750	1,525	1,650	1,600	1,730	1,650	1,700	1,550	1,750	17.4	15.0	20.0	23.9	21.0	17.7	326.21	309.75
Connecticut	1,668	1,725	1,735	1,510	1,680	1,650	1,730	1,625	1,700	1,550	1,770	18.1	16.5	20.5	24.1	21.0	18.5	336.24	327.45
New York	1,210	1,148	1,250	1,150	1,175	1,175	1,250	1,330	1,300	1,020	1,300	10.4	8.5	10.4	12.6	12.2	12.0	137.70	150.00
Pennsylvania	1,334	1,370	1,375	1,260	1,325	985	1,500	1,420	1,450	1,200	1,450	9.5	9.3	9.5	8.5	7.5	8.5	122.18	123.25
Maryland	694	650	600	660	700	710	690	735	660	740	800	7.6	7.7	7.5	8.0	9.3	8.0	58.77	64.00
Virginia	730	675	675	760	815	775	780	800	600	770	650	9.8	9.0	9.6	12.0	13.9	9.0	76.91	58.50
West Virginia	756	790	780	720	750	875	640	750	760	680	820	10.7	10.3	8.0	11.0	12.0	11.0	76.26	90.20
North Carolina	633	608	580	625	670	600	600	710	620	670	650	11.8	10.6	11.6	16.0	18.5	11.5	88.77	74.75
South Carolina	700	736	670	900	865	800	630	810	700	760	730	10.3	8.6	12.6	10.9	13.8	9.7	81.65	70.81
Georgia	814	525	675	860	975	700	680	900	830	1,000	1,000	29.0	20.0	28.0	30.0	31.0	25.0	239.40	250.00
Florida	856	600	875	925	990	710	680	940	840	1,000	1,000	30.9	23.0	28.0	30.0	31.0	30.0	256.32	300.00
Ohio	871	850	1,060	900	670	925	810	925	920	750	900	9.5	8.5	7.6	9.1	11.4	8.8	77.51	79.20
Indiana	856	819	915	940	700	950	880	910	800	750	900	9.2	9.5	7.8	9.0	11.0	9.0	78.02	81.00
Illinois	780	900	820	800	755	750	790	750	760	700	780	9.2	9.5	7.8	9.0	11.5	12.0	75.21	93.60
Wisconsin	1,200	1,370	1,275	1,100	1,130	1,180	1,050	1,250	1,290	1,180	1,180	10.1	7.5	10.0	11.0	12.0	11.0	123.23	129.80
Missouri	879	778	730	825	875	885	1,050	800	1,000	650	1,200	11.5	12.0	12.0	12.0	12.7	13.0	116.11	156.00
Kentucky	838	830	870	890	815	835	810	880	780	760	910	8.8	8.7	7.7	8.7	10.0	8.4	71.71	76.44
Tennessee	765	768	785	800	800	730	760	810	660	720	820	8.2	8.4	8.5	7.1	8.4	7.5	60.31	61.50
Alabama	581	450	510	450	450	600	500	700	750	700	700	25.0	20.0	25.0	35.0	25.0	28.0	181.70	196.00
Louisiana	488	500	475	350	850	550	550	450	300	450	400	29.8	25.0	31.0	30.0	25.0	35.0	123.90	140.00
Texas	633	500	550	700	800	650	800	650	700	600	580	23.0	25.0	20.0	17.5	22.0	21.0	131.26	121.80
Arkansas	634	700	695	570	610	600	650	600	650	650	610	15.0	13.0	12.0	18.0	16.4	18.0	101.88	109.80
United States	826.5	815.6	857.2	850.5	820.2	804.3	807.7	893.7	785.5	784.3	845.7	10.1	9.3	9.4	10.8	12.8	9.8	85.48	82.89

[1] Based upon farm price Dec. 1.

TOBACCO—Continued.

TABLE 98.—*Tobacco: Acreage, production, and farm value, by types and districts, 1913 and 1914.*

Type and district.	Acreage (thousands of acres).		Yield per acre (pounds).		Production (thousands of pounds).		Average farm price per pound Dec. 1 (cents).		Total farm value (thousands of dollars).[1]	
	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913
I. CIGAR TYPES.										
New England	27.0	24.7	1,765	1,550	47,651	38,295	18.3	21.0	8,721	8,042
New York	4.6	4.3	1,300	1,020	5,980	4,386	12.0	12.2	718	535
Pennsylvania	33.1	38.9	1,450	1,200	47,995	46,680	7.5	7.5	3,600	3,501
Ohio—Miami Valley	56.4	51.3	960	730	54,144	37,449	9.1	11.0	4,927	4,119
Wisconsin	45.6	43.0	1,180	1,180	53,808	50,740	7.5	12.0	4,036	6,089
Georgia and Florida	6.2	5.8	1,000	1,000	6,200	5,800	28.5	31.0	1,767	1,798
II. CHEWING, SMOKING, SNUFF, AND EXPORT TYPES.										
Burley district	244.2	232.6	920	760	224,664	176,776	8.1	12.3	18,198	21,743
Dark districts of Kentucky and Tennessee:										
Paducah district	70.0	75.0	780	780	54,600	58,500	6.1	7.7	3,331	4,504
Henderson or stemming district	71.5	55.0	950	800	67,925	44,000	6.3	7.3	4,279	3,212
One-Sucker district	38.4	38.4	960	740	36,864	28,416	5.6	7.0	2,064	1,989
Clarksville and Hopkinsville district	98.9	115.0	800	700	79,120	80,500	7.5	9.0	5,934	7,245
Virginia sun-cured district	12.0	15.9	760	800	9,120	12,720	6.5	8.5	593	1,081
Virginia dark district	50.0	71.2	740	820	37,000	58,384	7.3	7.0	2,701	4,087
Bright yellow district:										
Old belt—Virginia and North Carolina	240.0	240.0	600	690	144,000	165,600	11.0	18.5	15,840	30,636
New belt—Eastern North Carolina and South Carolina	185.0	165.0	710	710	131,350	117,150	11.6	17.9	15,237	20,970
Maryland and eastern Ohio export	24.9	27.6	820	760	20,418	20,976	8.0	9.1	1,633	1,909
Perique—Louisiana	.7	.6	400	450	280	270	35.0	25.0	98	68
Scattering	15.0	10.6			13,580	7,260			1,212	940

[1] Based upon farm price Dec. 1.

TOBACCO—Continued.

TABLE 90.—*Tobacco: Wholesale price per pound, 1900–1914.*

Date.	Cincinnati, leaf, plug, stock, common to good red.[1]		Hopkinsville, leaf, common to fine.		Louisville, leaf (Burley, dark red), common to good.		Clarksville, leaf, common to fine.		Richmond, leaf, smokers, common to good.		Baltimore, leaf, (Maryland), medium to fine red.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
1900	5.00	20.00	6.00	14.00	5.50	14.00	5.50	13.50	......	......	5.00	10.00
1901	4.50	12.00	5.00	15.00	5.50	12.50	6.00	14.00	......	......	6.00	11.00
1902	5.00	11.00	4.25	14.00	4.50	12.00	6.00	12.50	......	......	6.00	12.00
1903	4.00	12.00	5.00	13.50	5.00	13.75	5.50	13.00	......	......	6.50	12.00
1904	4.00	12.50	3.50	12.50	6.00	24.50	4.75	12.00	6.00	12.50	6.00	12.00
1905	4.00	14.00	5.00	14.00	5.50	14.50	5.75	13.00	8.00	13.00	6.00	12.00
1906	4.50	13.00	5.76	15.00	6.25	17.00	6.50	12.50	9.00	13.00	6.00	12.00
1907	6.50	17.50	6.50	16.00	6.50	14.50	7.50	17.00	9.00	13.00	6.50	12.00
1908	8.00	20.00	7.50	20.00	9.00	19.00	9.00	18.00	5.00	13.25	0.50	13.00
1909	12.00	20.00	6.00	14.00	12.00	18.50	7.50	14.00	5.00	10.00	8.50	13.00
1910	7.00	16.75	6.60	17.50	8.00	17.00	8.00	16.50	5.00	10.00	8.50	13.00
1911	5.50	14.50	7.60	18.00	6.00	12.75	9.50	15.50	5.00	12.00	8.50	13.00
1912	5.00	14.00	8.00	16.00	7.00	13.00	9.50	15.00	6.00	12.00	8.50	15.00
1913	5.50	13.75	[2] 7.00	[2] 14.00	7.00	16.00	8.50	15.00	[3] 6.00	[3] 16.00	8.50	15.00
1914.			(2)						(3)			
January	6.00	14.00	8.00	14.00	10.00	16.00	9.50	15.00	......	......	8.50	15.00
February	6.00	14.00	9.00	13.00	10.00	16.00	9.50	15.00	......	......	8.50	15.00
March	5.50	14.00	8.50	14.00	9.00	16.00	9.50	15.00	......	......	8.50	15.00
April	5.50	13.00	8.00	14.00	9.00	15.00	9.50	16.00	7.00	20.00	8.50	15.00
May	5.50	13.00	8.00	14.00	9.00	15.00	10.00	16.00	7.00	20.00	8.50	15.00
June	5.50	13.00	8.50	14.00	9.00	15.00	10.00	16.00	7.00	20.00	8.50	15.00
July	5.50	13.00	9.00	14.00	9.00	16.00	10.00	16.00	7.00	20.00	9.00	15.00
August	5.50	13.00	......	......	10.00	16.00	10.00	16.00	7.00	20.00	9.00	15.00
September	5.50	13.00	8.00	14.00	10.00	16.00	10.00	16.00	7.00	20.00	8.00	15.00
October	5.50	13.00	7.50	14.00	10.00	16.00	10.00	16.00	7.00	20.00	8.00	13.00
November	5.50	13.00	7.50	14.00	10.00	16.00	10.00	16.00	7.00	20.00	8.00	13.00
December	5.50	13.00	......	......	10.00	16.00	7.50	16.00	7.00	20.00	8.00	13.00
Year	*5.50*	*14.00*	*7.50*	*14.00*	*9.00*	*16.00*	*7.50*	*16.00*	*7.00*	*20.00*	*8.00*	*15.00*

[1] Common to fine red, 1900 and 1901.
[2] Common to good, February to November, inclusive.
[3] Brights, smokers, common to fine.

TOBACCO—Continued.

Table 100.—*Tobacco (unmanufactured): International trade, calendar years 1911-1913.*

[Tobacco comprises leaf, stems, strippings, and tombac, but not snuff. See "General note," p. 516.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Aden [1]	8,548	8,825	10,475	Netherlands	3,713	3,686	3,456
Algeria	13,426	14,445	14,445	Paraguay	11,312	8,481	8,481
Austria-Hungary	24,073	26,281	19,247	Persia [2]	2,889	3,776	3,776
Brazil	40,761	54,466	64,768	Philippine Islands	27,656	30,945	28,585
British India	34,560	32,256	35,843	Russia	22,950	23,674	28,044
Bulgaria	4,812	3,578	3,578	Santo Domingo	30,441	12,687	21,584
Ceylon	4,088	4,482	4,482	Turkey [3]	51,582	54,582	54,582
Cuba	32,234	42,983	30,669	United States	370,284	410,832	414,372
Dutch East Indies	170,226	189,551	189,551	Other countries	60,445	58,306	50,340
Greece	18,629	24,238	21,876				
Mexico	2,101	1,271	1,271	Total	940,730	1,009,424	1,039,423

IMPORTS.

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
Aden [1]	12,783	12,734	11,401	Italy	43,460	47,917	56,169
Argentina	14,047	18,787	17,917	Netherlands	57,266	55,523	65,913
Australia	14,901	15,036	15,805	Norway	3,731	4,355	4,066
Austria-Hungary	50,429	49,183	48,174	Portugal	6,739	6,482	6,382
Belgium	20,695	25,989	21,597	Southern Nigeria	5,049	6,602	6,602
British India	5,196	6,346	7,048	Spain	48,031	60,584	60,279
Canada	17,815	20,355	21,958	Sweden	10,054	9,913	9,913
China	13,026	19,057	21,545	Switzerland	18,154	19,423	18,170
Denmark	10,674	10,211	10,407	United Kingdom	119,347	137,970	155,688
Egypt	19,008	19,549	19,613	United States	52,901	57,472	66,800
Finland	9,377	10,294	9,450	Other countries	54,453	57,166	52,314
France	61,167	70,869	81,779				
Germany	162,020	178,443	182,775	Total	831,228	920,056	975,104

[1] Year beginning Apr. 1. [2] Year beginning Mar. 21. [3] Year beginning Mar. 14, 1911.

FLAX.

TABLE 101.—*Flax: Area and production of undermentioned countries, 1911-1913.*

[000 omitted.]

Country.	Area.			Production.					
				Seed.			Fiber.		
	1911	1912	1913	1911	1912	1913	1911	1912	1913
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bush.*	*Bush.*	*Bush.*	*Pounds.*	*Pounds.*	*Pounds.*
United States	2,757	2,851	2,291	19,370	28,073	17,853			
Canada:									
Quebec	1	1	1	13	9	9			
Ontario	9	9	7	124	143	164			
Manitoba	80	100	54	1,152	1,252	632			
Saskatchewan	682	1,780	1,386	7,672	23,033	15,579			
Alberta	107	132	105	1,114	1,693	1,155			
Total Canada	879	2,022	1,553	10,075	26,130	17,539			
Mexico	(1)	(1)	(1)	150	150	150			
Total				29,595	54,353	35,542			
SOUTH AMERICA.									
Argentina	3,716	4,028	4,382	23,424	22,518	44,486			
Uruguay	95	143	141	660	879	1,302			
Total				24,084	23,397	45,788			
EUROPE.									
Austria-Hungary:									
Austria	95	91	90	697	650	608	46,046	51,532	48,976
Hungary proper	21	(1)	(1)	174	174	174	13,932	(1)	(1)
Croatia-Slavonia	17	(1)	(1)	15	15	15	6,448	(1)	(1)
Bosnia-Herzegovina	(1)	(1)	(1)	4	4	4	1,000	1,000	1,000
Total Austria-Hungary				890	843	801	68,026		
Belgium	49	54	57	515	514	387	52,000	64,000	39,437
Bulgaria	*1*	*1*	(1)	*12*	*6*	*8*	*878*	*308*	(1)
France	59	69	71	496	576	300	45,003	46,074	(1)
Italy	22	22	22	341	343	405	6,078	5,511	5,732
Netherlands	*39*	*36*	*36*	*579*	*429*	*326*	*20,929*	*21,217*	*16,606*
Roumania	52	79	67	607	772	569	4,530	8,953	4,759
Russia:									
Russia proper	3,237	3,237	(1)	18,877	20,574				
Poland	95	80	(1)	935	793				
Northern Caucasia	96	137	(1)	732	810				
Total Russia (European)	3,428	3,454	3,676	20,544	22,177	24,447	[2] 785,136	[2] 1,172,059	1,703,209
Servia	4	4	(1)				2,091	2,095	(1)
Sweden	4	4	(1)	17	17	17	1,500	1,212	(1)
Ireland	67	55	59	(1)	(1)	(1)	25,179	29,021	28,341
Total				24,001	25,676	27,360	1,011,350		
ASIA.									
British India	3,757	4,946	4,125	22,544	25,648	21,544			
Russia:									
Central Asia	125	89	(1)	220	358				
Siberia	154	137	(1)	785	779				
Trancaucasia	19	16	(1)	94	93				
Total Russia (Asiatic)	298	242	(1)	1,099	1,230	1,300			
Total				23,643	26,878	22,844			
AFRICA.									
Algeria	2	1	(1)	16	13	15	(1)	(1)	(1)
Grand total				101,339	130,317	131,549	1,011,350		

[1] No official data.

[2] Includes 27 Governments only.

FLAX—Continued.

TABLE 102.—*Flax (seed and fiber): Total production of countries named in Table 101, 1896–1912.*

Year.	Production.		Year.	Production.	
	Seed.	Fiber.		Seed.	Fiber.
	Bushels.	*Pounds.*		*Bushels.*	*Pounds.*
1896	82,084,000	1,714,205,000	1905	100,458,000	1,484,229,000
1897	57,596,000	1,498,054,000	1906	88,165,000	1,871,723,000
1898	72,938,000	1,780,023,000	1907	102,960,000	2,042,490,000
1899	66,348,000	1,128,763,000	1908	100,820,000	1,907,591,000
1900	62,432,000	1,315,931,000	1909	100,820,000	1,384,524,000
1901	72,314,000	1,050,250,000	1910	85,253,000	913,112,000
1902	83,891,000	1,364,540,000	1911	101,330,000	1,011,350,000
1903	110,455,000	1,492,583,000	1912	129,417,000	.....
1904	107,743,000	1,517,922,000	1913	131,549,000	.....

TABLE 103.—*Flaxseed: Acreage, production, value, etc., in the United States, 1849–1914.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of acres are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available.

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Condition of growing crop.			
						July 1.	Aug. 1.	Sept. 1.	When harvested.
	Acres.	*Bushels.*	*Bushels.*	*Cents.*	*Dollars.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1849			*562,000*						
1859			*567,000*						
1869			*1,730,000*						
1879			*7,170,000*						
1889	*1,319,000*	*7.8*	*10,250,000*						
1899	*2,111,000*	*9.5*	*19,979,000*						
1902	3,740,000	7.8	29,285,000	105.0	30,815,000				
1903	3,233,000	8.4	27,301,000	81.7	22,292,000	86.2	80.3	80.5	74.0
1904	*2,264,000*	*10.3*	*23,401,000*	*99.3*	*23,229,000*	*86.6*	78.9	85.8	*87.0*
1905	2,535,000	11.2	28,478,000	84.4	24,049,000	92.7	96.7	94.2	91.5
1906	2,506,000	10.2	25,576,000	101.3	25,899,000	93.2	92.2	89.0	87.4
1907	2,864,000	9.0	25,851,000	95.6	24,713,000	91.2	92.9	85.4	78.0
1908	2,679,000	9.6	25,805,000	118.4	30,577,000	92.5	86.1	82.5	81.2
1909	2,742,000	9.4	25,856,000						
1909	*2,083,000*	*9.4*	*19,513,000*	152.9	29,795,000	95.1	92.7	88.9	84.9
1910[1]	*2,467,000*	*5.2*	*12,718,000*	231.7	29,472,000	65.0	51.7	48.3	47.2
1911	2,757,000	7.0	19,370,000	182.1	35,272,000	80.9	71.0	68.4	69.6
1912	2,851,000	9.8	28,073,000	114.7	32,202,000	88.9	87.5	86.3	83.8
1913	2,291,000	7.8	17,853,000	119.9	21,399,000	82.0	77.4	74.9	74.7
1914	1,835,000	8.3	15,559,000	125.6	19,540,000	90.5	82.1	72.9	77.4

[1] Figures adjusted to census basis.

FLAX—Continued.

TABLE 104.—*Flaxseed: Acreage, production, and total farm value, by States, 1914.*

State.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Bushels.*	*Cents.*	*Dollars.*
Wisconsin	8,000	13.5	108,000	125	135,000
Minnesota	315,000	9.3	2,930,000	128	3,750,000
Iowa	20,000	9.5	190,000	120	228,000
Missouri	8,000	8.0	64,000	104	67,000
North Dakota	840,000	8.3	6,972,000	128	8,924,000
South Dakota	320,000	7.5	2,400,000	123	2,952,000
Nebraska	7,000	7.0	49,000	119	58,000
Kansas	45,000	6.0	270,000	125	338,000
Montana	320,000	8.0	2,560,000	120	3,072,000
Colorado	2,000	8.0	16,000	100	16,000
United States	1,885,000	8.3	15,559,000	125.6	19,540,000

TABLE 105.—*Flaxseed: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average 1905-1914	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	10-year average 1905-1914	1910	1911	1912	1913	1914	5-year average 1910-1914	1914
Wis.	13.4	13.0	14.0	14.2	16.0	14.5	10.0	12.0	12.5	14.0	13.5	132	220	185	127	123	125	18.84	16.88
Minn.	9.7	11.3	11.0	10.5	10.6	10.0	7.5	8.0	10.2	9.0	9.3	134	230	182	120	123	128	13.40	11.90
Iowa	10.6	11.4	11.4	11.5	10.9	9.8	12.2	8.0	11.5	9.4	9.5	129	220	185	124	123	120	15.77	11.40
Mo.	7.1	7.8	7.3	10.0	7.0	8.1	8.4	3.0	6.0	5.0	8.0	122	210	190	110	115	104	8.80	8.32
N. Dak.	8.4	11.6	9.9	8.0	9.0	9.3	3.6	7.6	9.7	7.2	8.3	134	235	184	114	121	128	10.57	10.62
S. Dak.	8.5	11.2	10.5	10.0	10.7	9.4	5.0	5.3	8.6	7.2	7.5	131	229	178	113	120	123	9.66	9.22
Nebr.	8.5	10.2	8.5	11.0	11.0	8.5	8.0	5.0	9.5	6.0	7.0	128	225	185	128	110	119	10.87	8.33
Kans.	6.9	8.0	8.2	10.0	6.5	7.0	8.2	3.0	6.0	6.0	6.0	124	210	190	130	116	125	9.04	7.50
Mont.	10.2	10.0	12.0	13.0	11.5	12.0	7.0	7.7	12.0	9.0	8.0	129	240	180	112	115	120	12.81	9.60
Colo.	7.0	.....	.....	.....	.....	.....	7.0	7.0	8.0	5.0	8.0	149	225	180	125	115	100	10.42	8.00
U. S.	8.8	11.2	10.2	9.0	9.6	9.4	5.2	7.0	9.8	7.8	8.3	132.7	231.7	182.1	114.7	119.9	125.6	11.15	10.37

[1] Based upon farm price Dec. 1.

FLAX—Continued.

TABLE 106.—*Flaxseed: Farm price per bushel, on first of each month, by geographical divisions, 1913 and 1914.*

Month.	United States.		North Central States east of Mississippi River.		North Central States west of Mississippi River.		Far Western States.	
	1914	1913	1914	1913	1914	1913	1914	1913
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
January	124.2	106.2	141.0	137.0	12[illegible].5	107.0	110.0	100.0
February	127.8	109.3		119.0	128.5	112.0	12[illegible].0	98.0
March	132.5	119.0	149.0	130.0	1[illegible].7	120.0	127.0	115.0
April	132.8	115.6	140.0	130.0	137.2	110.0	123.0	129.0
May	134.7	114.3	129.0	138.0	[illegible]	114.0	140.0	113.0
June	136.8	115.8	148.0	110.0	136.2	116.0	139.0	116.0
July	136.0	113.4	141.0	105.0	139.5	114.0	122.0	110.0
August	130.7	118.6	148.0		130.9	118.0	150.0	121.0
September	139.3	127.8	135.0	125.0	144.2	127.0	120.0	130.0
October	127.4	122.6	141.0	160.0	129.2	124.0	120.0	114.0
November	118.7	118.7	121.0	118.0	118.[illegible]	120.0		114.0
December	125.6	119.9	125.0	123.0	126.7	121.0	110.9	115.0

TABLE 107.—*Flaxseed: Wholesale price per bushel, 1900–1914.*

Date.	*Cincinnati.* Low.	*Cincinnati.* High.	*Minneapolis.* Low.	*Minneapolis.* High.	*Milwaukee.* No. 1 Northwestern. Low.	*Milwaukee.* No. 1 Northwestern. High.	*Duluth.* Low.	*Duluth.* High.
1900	$1.00	$1.45	$1.32	$1.86	$1.30	$1.86	$1.28½	$1.87
1901	1.20	1.50	1.38	1.90	1.39	1.88	1.33	1.88
1902	1.25	1.40	1.13	1.80	1.18	1.80	1.15¼	1.78
1903	1.00	1.30	.89	1.24	.94	1.24	.92	1.20
1904	1.00	1.00	.97	1.28	1.06	1.28	1.01½	1.28
1905	1.10	1.10	.92	1.47	.98	1.47	.98½	1.50
1906	1.10	1.12	1.03	1.25	1.05	1.25	1.09¼	1.25
1907	1.12	1.12	.96	1.36½	1.07	1.34	1.06½	1.41½
1908	1.12	1.25	1.06¼	1.51½	1.12	1.47	1.12⅞	1.49¾
1909	1.25	1.25	1.29	1.99	1.35	2.09	1.36½	2.04¼
1910	1.75	2.75	1.75	2.84	1.91½	2.75	1.89	2.84
1911	2.50	2.75	1.93	2.74½	1.92	2.70	1.93	2.70
1912	1.50	2.80	1.28	2.20	1.24½	2.36	1.22	2.53
1913	1.50	1.50	....	....	1.25½	1.54½	1.22⅞	1.53¼
1914.								
January	1.50	1.50	1.47½	1.51	1.45¼	1.52¾	1.48	1.52¼
February	1.50	1.50	1.48¼	1.59¼	1.45¾	1.59½	1.48¼	1.58¾
March	1.50	1.50	1.53¾	1.60½	1.53¾	1.64	1.55⅝	1.61⅝
April	1.50	1.50	1.50½	1.57⅞	1.54¼	1.62¼	1.52	1.59⅝
May	1.50	1.50	1.54¼	1.57½	1.50¼	1.75	1.54¼	1.60
June	1.50	1.60	1.56¾	1.61½	1.58¾	1.66	1.58⅞	1.63¼
July	1.40	1.50	1.58	1.88	1.60	1.93	1.56¼	1.93
August	1.40	1.40	1.55	1.70⅞	1.57	1.76	1.54¼	1.71
September	....	....	1.42½	1.64	1.43½	1.72¾	1.42¾	1.62¾
October	....	....	1.28	1.40½	1.30	1.46	1.28¾	1.43½
November	....	....	1.33¼	1.49¼	1.36	1.55	1.33¾	1.53¾
December	....	....	1.44¾	1.62¼	1.45	1.60	1.45½	1.56½
Year	1.40	1.50	1.28	1.88	1.30	1.93	1.28¾	1.93

RICE.

TABLE 108.—*Rice: Area and production of undermentioned countries, 1911–1913.*

[Mostly cleaned rice.]

Country.	Area.			Production.		
	1911	1912	1913	1911	1912	1913
NORTH AMERICA.						
United States:	*Acres.*	*Acres.*	*Acres.*	*Pounds.*	*Pounds.*	*Pounds.*
Contiguous	696,000	723,000	827,000	637,056,000	695,944,000	715,111,000
Noncontiguous—Hawaii[1]	*9,000*	*9,000*	*9,000*	*25,820,000*	*25,820,000*	*25,820,000*
Total	705,000	732,000	836,000	662,876,000	721,764,000	740,931,000
Central America:						
Guatemala			4,000	[2] 3,650,000	3,650,000	3,501,000
Mexico[5]	(4)	(4)	(4)	220,460,000	220,460,000	220,460,000
Total				224,110,000	224,110,000	223,961,000
SOUTH AMERICA.						
Argentina	19,000	8,000	13,000	34,171,000	19,841,000	19,841,000
Brazil: São Paulo		224,000		82,753,000	137,323,000	109,625,000
British Guiana	33,000	38,000	44,000	61,185,000	[5] 61,185,000	
Dutch Guiana				2,986,000	3,619,000	[5] 3,619,000
Peru	*138,000*	*138,000*	*138,000*	*114,313,000*	*114,313,000*	*108,869,000*
Total				295,498,000	336,281,000	
EUROPE.						
Bulgaria	6,000	7,000	7,000	6,666,000	8,261,000	7,716,000
France	1,000	1,000		4,526,000	1,257,000	[5] 1,257,000
Greece[5]				1,633,000	1,633,000	1,633,000
Italy	360,000	360,000	362,000	652,153,000	598,100,000	739,221,000
Spain	94,000	95,000	96,000	282,306,000	332,358,000	303,310,000
Turkey, European[6]	*7,000*			*1,387,000*	*1,387,000*	*1,387,000*
Total				948,671,000	942,996,000	1,054,524,000
ASIA.						
British India, including Native States[7]	64,726,000	71,623,000	70,583,000	67,364,976,000	63,805,168,000	63,093,184,000
Ceylon	645,000	801,000	620,000	283,882,000	283,882,000	283,882,000
Chosen (Korea)	2,283,000			1,390,970,000	[5] 1,390,970,000	2,218,293,000
Formosa	1,183,000	1,189,000	1,236,000	*638,540,000*	*575,406,000*	1,543,220,000
Japan	7,286,000	7,360,000	7,393,000	7,353,221,000	7,141,362,000	7,142,418,000
Java and Madura	5,894,000	5,860,000	7,150,000	7,459,050,000	[5] 7,459,050,000	8,905,350,000
Philippine Islands	2,579,000	2,666,000	2,820,000	1,267,300,000	717,441,000	1,377,875,000
Russia, Asiatic: Caucasus and Central Asia	682,000	491,000	596,000	382,757,000	276,938,000	447,655,000
Siam[3]		3,558,000		3,214,258,000	3,214,258,000	3,214,258,000
Straits Settlements	*92,000*	*92,000*	*92,000*	(8)	(8)	(8)
Turkey, Asiatic[6]	101,000			137,333,000	137,333,000	137,333,000
Total				89,492,314,000	85,001,808,000	88,363,495,000
AFRICA.						
Egypt	236,000	235,000	252,000	523,438,000	439,799,000	506,895,000
Madagascar[9]				953,000	953,000	953,000
Nyasaland[10]	(4)	(4)	(4)	*1,947,000*	1,846,000	*3,385,000*
Total				526,338,000	442,598,000	511,233,000
OCEANIA.						
Fiji	12,000	11,000		(4)	(4)	(4)
Grand total				92,149,717,000	87,609,557,000	

[1] Census of 1909.
[2] Average production as unofficially estimated.
[3] Data for 1912.
[4] No official statistics.
[5] Year preceding.
[6] *Data for European and Asiatic Turkey are for 1910 and do not include all the provinces and districts.*
[7] Data refer to crop years beginning in the spring of the calendar years mentioned. The data relate to 96 per cent of the total area under rice in India in 1911. The total area under rice in 1911 is given in Agricultural Statistics of India as follows: British Provinces, 76,636,887 acres; Native States, 2,482,761 acres.
[8] Data incomplete.
[9] Data for 1908.
[10] Includes only crops raised by natives.

RICE—Continued.

TABLE 109.—*Rice: Total production in countries named in Table 108, 1900–1913.*[1]

Year.	Production.	Year.	Production.
	Pounds.		*Pounds.*
1900	91,584,400,000	1907	105,354,132,000
1901	99,145,600,000	1908	106,902,842,000
1902	108,626,400,000	1909	131,660,408,000
1903	110,865,000,000	1910	120,214,621,000
1904	115,735,840,000	1911	[2]102,149,717,000
1905	108,863,551,000	1912	[2]87,669,537,000
1906	112,363,176,000	1913	....

[1] In 1910 the rice crop of 3 provinces of China was reported as 47,201,000,000 pounds. Prior to 1911 figures include estimate of 5,000,000,000 pounds for crop of French Indo-China.
[2] *Data for 1911–1912 not strictly comparable with earlier years.*

TABLE 110.—*Rice: Acreage, production, value, etc., in the United States, 1904–1914.*

Year.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.	Condition of growing crop.			
						July 1.	Aug. 1.	Sept. 1.	When harvested.
	Acres.	*Bushels.*	*Bushels.*	*Cents.*	*Dollars.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
1904	662,000	31.9	21,096,000	65.8	13,892,000	88.2	90.2	86.7	87.3
1905	460,000	28.1	12,933,000	95.0	12,286,000	88.0	92.9	92.2	89.3
1906	575,000	31.1	17,855,000	90.3	16,121,000	82.9	83.1	86.8	87.2
1907	627,000	29.9	18,738,000	85.8	16,081,000	88.7	88.6	87.0	88.7
1908	655,000	33.4	21,890,000	81.2	17,771,000	92.9	94.1	93.6	87.7
1909	720,000	33.8	24,368,000	79.4	19,341,000	.....	.....	.....	.....
1909	*610,000*	*35.8*	*21,839,000*	79.6	17,383,000	90.7	84.5	84.7	81.2
1910	723,000	33.9	24,510,000	67.8	16,624,000	88.3	87.6	88.8	88.1
1911	696,000	32.9	22,934,000	79.7	18,274,000	87.7	88.3	87.2	83.4
1912	723,000	34.7	25,054,000	93.5	23,423,000	86.3	86.3	88.8	89.2
1913	827,000	31.1	25,744,000	85.8	22,090,000	88.4	88.7	88.0	80.3
1914	694,000	34.1	23,649,000	92.4	21,849,000	86.5	87.6	88.9	88.0

TABLE 111.—*Rice: Acreage, production, and farm value, by States, 1914.*

State.	Acreage.	Average yield per acre.	Production.	Average farm price per bushel Dec. 1.	Farm value Dec. 1.
	Acres.	*Bushels.*	*Bushels.*	*Cents.*	*Dollars.*
North Carolina	150	26.3	4,000	75	3,000
South Carolina	6,900	26.0	179,000	92	165,000
Georgia	1,100	28.0	31,000	89	28,000
Florida	400	25.0	10,000	70	7,000
Alabama	200	28.0	6,000	70	4,000
Mississippi	1,000	30.0	30,000	85	26,000
Louisiana	336,500	32.1	10,802,000	93	10,046,000
Texas	239,700	33.8	8,102,000	92	7,454,000
Arkansas	92,580	39.8	3,685,000	90	3,316,000
California	15,000	53.3	800,000	100	800,000
United States	693,530	34.1	23,649,000	92.4	21,849,000

RICE—Continued.

TABLE 112.—*Rice: Yield per acre, price per bushel Dec. 1, and value per acre, by States.*

State.	Yield per acre (bushels).											Farm price per bushel (cents).						Value per acre (dollars).[1]	
	10-year average, 1905–1914.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	10-year average, 1905–1914.	1910	1911	1912	1913	1914	5-year average, 1910–1914.	1914
N. C.	26.1	26.0	28.9	23.0	25.2	30.2	26.5	25.6	25.0	24.0	26.3	87	75	76	90	80	75	20.15	19.72
S. C.	23.8	26.0	22.0	27.0	24.0	25.6	21.0	11.7	25.0	30.0	26.0	94	75	75	93	90	92	19.74	23.92
Ga.	27.7	32.0	23.0	34.0	25.0	23.9	22.0	26.8	30.0	32.0	28.0	91	75	77	90	83	89	23.12	24.92
Fla.	26.4	28.0	35.0	30.0	25.0	25.0	21.0	25.0	25.0	25.0	25.0	85	72	75	90	60	70	17.77	17.50
Ala.	28.3	30.0	23.0	25.0	45.0	35.0	25.0	20.0	30.0	22.0	28.0	82	70	70	90	60	70	18.26	19.60
Miss.	28.6	24.0	20.0	22.0	31.0	30.0	30.0	36.0	35.0	28.0	30.0	84	70	77	90	70	85	25.06	25.50
La.	30.9	25.8	28.0	28.0	33.0	33.8	34.4	31.5	33.5	29.0	32.1	84	67	79	93	84	93	26.66	29.85
Tex.	33.6	31.0	36.0	32.0	34.5	34.0	33.0	34.3	35.5	32.0	33.8	86	68	80	94	86	92	28.37	31.10
Ark.	36.8	27.0	31.0	37.0	41.0	40.0	40.0	39.0	37.5	36.0	39.8	88	70	82	94	90	90	32.69	35.82
Cal.	44.9	.....	.....	.....	.....	.....	33.0	40.0	50.0	48.0	53.3	86	65	75	91	100	100	39.86	53.30
U. S.	32.3	28.1	31.1	29.9	33.4	33.8	33.9	32.9	34.7	31.1	34.1	85.1	67.8	79.7	93.5	85.8	92.4	27.97	31.50

[1] Based upon farm price Dec. 1.

TABLE 113.—*Rice: Wholesale price per pound, 1900–1914.*

Date.	New York.		Cincinnati.		Lake Charles.		New Orleans.		Houston.	
	Domestic (good).		Prime.		Rough.[1]		Honduras, cleaned.		Head rice, cleaned.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Dolls.*	*Dolls.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
1900	4¾	5	5¼	6	.....	.....	3¾	6⅝	.....	.....
1901	4¾	5	5½	6½	1.70	3.50	1¾	6⅝	3	5
1902	4¾	5¼	5¼	6½	1.75	3.40	1½	6¼	3½	5⅝
1903	4¼	5¼	4⅝	5½	1.50	3.60	1⅛	6½	4	6¼
1904	3⅜	4¼	3¾	5¼	1.00	3.00	1⁵⁄₁₆	5¼	3	4¾
1905	3⅞	4⅞	3	5½	1.00	3.85	1	5¾	3	5
1906	4⅞	5½	4½	5¾	2.00	3.85	1¼	6	3½	5⅝
1907	5	6	4¾	6	1.75	4.10	1¼	6¼	4⅜	6¼
1908	5	6½	5½	8	1.75	4.33	1¾	7⅛	4⅝	6¼
1909	4¼	5⅞	4½	8	1.50	3.75	1⅛	6½	4⅜	6¼
1910	4	5⅝	4½	5½	1.55	3.25	1⅛	6¼	3	5¾
1911	3⅝	4⅞	4½	5½	1.75	3.50	1⅛	5⅜	2⅞	4¾
1912	4¼	5½	4½	6⅝	2.00	3.70	2	6	4	5⅝
1913	4¾	5⅞	5¼	6¼	2.00	3.82	1.15	7	4	6
1914.										
January	4¾	5	5¾	6¼	2.05	3.76	1¾	6	4⅝	5¼
February	4¾	5	5¾	6¼	1.40	3.40	1⅝	6	4	5¾
March	4¾	5	5¾	6¼	1.75	3.25	1¼	5⅞	4¾	6¼
April	4¾	5	5¾	6¼	2.00	3.50	1½	6	3⅞	4¾
May	4¾	5	5¾	6¼	2.45	3.60	1⁵⁄₁₆	6¼	4	5
June	4¾	5	5¾	6¼	2.75	3.70	1⅜	6	4	4⅞
July	4¾	5	5¾	6¼	2.80	3.75	1⁵⁄₁₆	5¾	3	4
August	4¾	5⅞	5¾	6¼	3.00	4.55	1¼	6⅝	4⅛	5¼
September	5¼	6⅛	5¾	6¼	3.50	4.55	2¼	6⅛	4⅜	5⅝
October	5¼	5⅞	5¾	6¼	3.00	4.00	1¾	5⅞	4⅜	5⅝
November	5⅛	6¼	5¾	6¼	2.45	3.55	1¾	5¼	4⅜	5
December	5	5⅞	5¾	6¼	2.60	3.56	1⅛	5½	4⅜	5
Year	4⅞	5¼	5¾	6¼	1.40	4.55	1⅛	6⅝	3	5⅞

[1] Per barrel of 162 pounds.

RICE—Continued.

TABLE 114.—*Rice: International trade, calendar years 1911-1913.*

[Mostly cleaned rice. Under rice is included paddy, unhulled, rough, cleaned, polished, broken, and cargo rice, in addition to rice flour and meal. Rice bran is not included. Rough rice or paddy, where specifically reported, has been reduced to terms of cleaned rice at ratio of 162 pounds rough or unhulled, to 100 pounds cleaned. "Rice, other than whole or cleaned rice," in the returns of United Kingdom is not considered paddy, since the chief sources of supply indicate that it is practically all hulled rice. Cargo rice, a mixture of hulled and unhulled, is included without being reduced to terms of cleaned. Broken rice and rice flour and meal are taken without being reduced to terms of whole cleaned rice. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.)
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Belgium	100,315	105,884	91,066	Penang	335,520	358,754	358,754
British India	5,784,910	6,2[illegible],746	5,761,625	Siam	1,3[illegible],145	1,286,904	2,[illegible]
Dutch East Indies	133,179	119,760	119,760	Singapore	727,123	684,895	683,896
France	66,625	55,866	65,044	Other countries	858,765	875,683	944,110
French Indo-China	1,815,968	1,792,772	1,792,772				
Germany	456,659	379,930	406,414	Total	12,117,104	12,4[illegible],581	13,319,904
Netherlands	476,776	480,315	544,317				

IMPORTS.

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.)
Austria-Hungary	201,771	154,100	166,011	Netherlands	728,228	735,325	903,971
Belgium	177,041	198,128	161,240	Penang	478,545	621,161	621,161
Brazil	36,447	22,545	17,146	Perak	174,243	181,638	181,638
British India	344,783	251,965	286,151	Philippine Islands	404,926	664,711	191,729
Ceylon	820,668	836,111	836,111	Russia	258,172	254,875	265,872
China	707,041	360,652	721,986	Selangor	154,861	178,604	178,604
Cuba	264,134	256,313	283,872	Singapore	939,504	965,300	965,300
Dutch East Indies	1,346,967	1,004,378	1,004,378	United Kingdom	682,872	765,978	771,512
Egypt	84,841	75,711	119,735	United States	185,546	182,874	229,514
France	539,481	390,904	537,934	Other countries	1,331,372	1,272,679	1,467,176
Germany	925,694	921,496	1,052,917				
Japan	573,180	744,812	744,812	Total	11,516,649	11,170,294	11,849,767
Mauritius	151,760	111,146	111,146				

HOPS.

TABLE 115.—*Hops: Area and production of undermentioned countries, 1912–1914.*

Country.	Area.			Production.		
	1912	1913	1914	1912	1913	1914
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Pounds.*	*Pounds.*	*Pounds.*
United States [1]	(2)	(2)	(2)	53,370,645	62,898,718	[3] 57,060,000
Canada [4]	(2)	(2)	(2)	1,208,000	1,208,000	1,208,000
Total	......	......	......	54,578,645	64,106,718	58,268,000
EUROPE.						
Austria-Hungary:						
Austria	50,171	50,062	(2)	47,413,872	18,879,533	(2)
Hungary, including Croatia and Slavonia	5,814	5,500	(2)	1,012,372	4,435,200	(2)
Total Austria-Hungary	55,985	55,562	(2)	48,426,244	23,314,733	31,117,000
Belgium	5,642	5,943	(2)	10,167,836	7,395,331	7,560,000
France	6,998	7,070	(2)	8,757,774	7,866,674	8,955,000
Germany	66,633	66,836	(2)	45,334,292	23,408,222	55,157,000
Russia	*24,297*	*24,297*	*24,297*	14,083,992	16,973,016	14,083,992
United Kingdom, England	34,829	35,676	36,664	41,996,837	28,631,792	[3] 56,812,896
Total	194,384	195,384	....	168,776,975	107,589,668	173,685,888
AUSTRALASIA.						
Australia:						
Victoria	122	131	(2)	87,024	155,344	160,000
South Australia	3	5	(2)	2,240	2,240	2,300
Tasmania	*1,029*	*1,247*	(2)	1,057,952	1,920,576	2,000,000
New Zealand [4]	[4] 653	....	(2)	710,000	710,000	710,000
Total	1,807	....	....	1,857,216	2,788,160	2,872,300
Grand total	....	....	....	225,212,836	174,484,646	234,826,188

[1] Commercial movement for years beginning July 1.
[2] No official statistics.
[3] Commercial estimate.
[4] 1911.

TABLE 116.—*Hops: Total production of countries named in Table 115, 1895–1914.*

Year.	Production.	Year.	Production.	Year.	Production.
	Pounds.		*Pounds.*		*Pounds.*
1895	204,894,000	1902	170,063,000	1909	128,173,000
1896	168,509,000	1903	174,457,000	1910	188,951,000
1897	189,219,000	1904	175,802,000	1911	163,810,000
1898	166,100,000	1905	277,260,000	1912	225,213,000
1899	231,563,000	1906	180,998,000	1913	174,485,000
1900	174,683,000	1907	215,923,000	1914 [1]	234,826,000
1901	201,902,000	1908	230,220,000		

[1] Preliminary.

HOPS—Continued.

Table 117.—*Hops: Wholesale price per pound, 1900-1914.*

Date.	New York: Choice State. Low.	New York: Choice State. High.	Cincinnati: Prime.[1] Low.	Cincinnati: Prime.[1] High.	Chicago: Pacific coast, good to choice.[2] Low.	Chicago: Pacific coast, good to choice.[2] High.	San Francisco: Sacramento Valley, choice. Low.	San Francisco: Sacramento Valley, choice. High.	San Francisco: Willamette Valley, choice.[3] Low.	San Francisco: Willamette Valley, choice.[3] High.	San Francisco: Eastern Washington, choice. Low.	San Francisco: Eastern Washington, choice. High.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
1900	12	21	10	18	6½	18			6	16	....	....
1901	15	20	13½	17½	12½	19			10	20		....
1902	14	38	14½	30	12½	41	....		14	28		....
1903	20½	37	24	29½	19	41			17	28		....
1904	32	41	28	37	28½	47	....		17½	42		....
1905	13	37	14½	33	10	34			9½	30		....
1906	11	25	12	18½	9	22			8	20		....
1907	12	23	12	....	6	18		....	5	13		....
1908	6	16	8	....	5	11	....		4	12½		....
1909	12	20	10	28	9	30						....
1910	21	55	15½	27½	14	26						....
1911	25	57	....		20	50						....
1912	22	56	22½	40	20	60	17	50	18½	50	18½	50
1913	17	48	18	32	15	31	18	28	18	30	19	30
1914.												
January	45	48	25	27	24	26	23	28	25	30	23	30
February	43	46	25	27½	24	27	19	25	20	25	20	26
March	42	45	22	25	23	25	19	22	20	23	20	23
April	41	44	21	24	21	23	19	22	20	23	20	23
May	38	40	22	22	19	21	16	22	16	23	16	23
June	36	38	21	22	18	21	16	17	16	17	16	17
July	36	38	18	18	18	20	16	17	16	17	16	17
August	35	38	20	20	19	22	14	18	15	19½	14	19
September	35	50	22	22	19	21	17	19	18	20	17	20
October	33	45	16	17	13	15	10	18	11	16	10	18
November	26	35	14	16	13	15	10	11	11	12	10	11
December	23	28	13½	15	13	15	10	12½	11	13	10	12
Year	23	50	13½	27½	13	27	10	28	11	30	10	30

[1] Choice 1900-1907 and 1909-1913.
[2] Common to choice 1901-1903; prime to choice, 1907.
[3] Quotations are for all grades to 1912.

Table 118.—*Hops: International trade, calendar years, 1911-1913.*

[Lupulin and *hopfenmehl* (hop meal) are not included with hops in the data shown. See "General note," p. 518.]

EXPORTS.

[000 *omitted.*]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Austria-Hungary	11,766	28,182	15,306	Russia	2,224	2,294	3,864
Belgium	8,958	3,969	5,908	United Kingdom	5,479	1,318	1,283
France	399	590	339	United States	14,104	15,572	25,701
[illegible]	[illegible]	15,254	14,299	Other countries	59	239	309

BEANS.

TABLE 119.—*Beans: Area and production of undermentioned countries, 1911–1913.*

Country.	Area.			Production.		
	1911	1912	1913	1911	1912	1913
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	[1] 784,000	(2)	(2)	[1] 11,145,000	(2)	(2)
Canada:[4]						
Nova Scotia	1,000	1,000	1,000	21,000	24,000	22,000
New Brunswick	(3)	(3)	(3)	8,000	7,000	4,000
Quebec	6,000	5,000	5,000	114,000	84,000	97,000
Ontario	45,000	46,000	40,000	876,000	801,000	670,000
British Columbia	(3)	(3)	(3)	8,000	5,000	8,000
Total Canada	52,000	52,000	46,000	1,027,000	921,000	801,000
Total				12,172,000		
SOUTH AMERICA.						
Argentina	65,000	66,000	65,000	(2)	(2)	(2)
Chile	72,000	90,000	85,000	1,360,000	1,669,000	1,551,000
EUROPE.						
Austria [4]	626,000	637,000	644,000	8,931,000	9,205,000	8,725,000
Hungary [5]	38,000	(2)	(2)	420,000	(2)	(2)
Do.[6]	1,471,000	(2)	(2)	7,128,000	(2)	(2)
Croatia-Slavonia [5]	25,000	(2)	(2)	261,000	(2)	(2)
Do.[6]	496,000	(2)	(2)	1,929,000	(2)	(2)
Belgium	21,000	20,000	(2)	662,000	514,000	(2)
Bulgaria	180,000	212,000	(2)	2,021,000	2,482,000	(2)
Denmark [4]	(2)	10,000	(2)	285,000	240,000	255,000
France	578,000	558,000	(2)	8,187,000	9,739,000	(2)
Italy	1,510,000	1,476,000	1,444,000	18,990,000	14,778,000	16,568,000
Luxemburg	3,000	3,000	3,000	53,000	55,000	74,000
Netherlands	63,000	59,000	60,000	1,664,000	1,939,000	1,821,000
Roumania [5]	92,000	103,000	108,000	1,058,000	1,109,000	1,303,000
Do.[6]	1,252,000	1,316,000	1,365,000	3,544,000	3,528,000	4,454,000
Russia:						
Russia proper	[7] 134,000	[7] 139,000	(2)	[7] 2,146,000	[7] 2,190,000	(2)
Poland	23,000	27,000	(2)	453,000	575,000	(2)
Northern Caucasia						(2)
Total Russia (European)	157,000	166,000		2,599,000	2,765,000	
Servia	24,000	[4] 30,000	(2)	1,453,000	[4] 1,491,000	(2)
Spain	1,114,000	1,120,000	1,139,000	13,035,000	10,534,000	11,737,000
Sweden	10,000	10,000	(2)	171,000	176,000	164,000
United Kingdom:						
England	294,000	270,000	258,000	7,572,000	7,636,000	7,517,000
Wales	1,000	1,000	1,000	29,000	29,000	31,000
Scotland	9,000	9,000	6,000	323,000	306,000	230,000
Ireland	2,000	1,000	1,000	60,000	61,000	64,000
Total United Kingdom	303,000	281,000	266,000	7,984,000	8,032,000	7,842,000
Total				80,375,000		
ASIA.						
British India [4]	13,946,000	14,129,000	(2)	(2)	(2)	(2)
Japan	1,652,000	1,607,000	(2)	26,289,000	25,382,000	(2)
Formosa [4]	83,000	84,000	(2)	604,000	526,000	(2)
Russia (22 governments)	26,000	27,000	(2)	294,000	378,000	(2)
AFRICA.						
Algeria	99,000	136,000	(2)	1,132,000	1,622,000	(2)
Egypt	563,000	539,000	(2)	(2)	(2)	(2)

[1] Census figures for 1909.
[2] No official statistics.
[3] Less than 500 acres.
[4] Includes other pulse.
[5] Grown alone.
[6] Grown with corn.
[7] Includes Northern Caucasia.

BEANS—Continued.

TABLE 119.—*Beans: Area and production of undermentioned countries, 1911-1913*—Con.

Country.	Area.			Production.		
	1911	1912	1913	1911	1912	1913
AUSTRALASIA.						
Australia:[1]	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
Queensland	(²)	(²)	(²)	3,000	2,000	3,000
New South Wales	(²)	(²)	(²)	7,000	20,000	16,000
Victoria	11,000	12,000	12,000	230,000	182,000	240,000
South Australia	10,000	12,000	9,000	302,000	102,000	132,000
Western Australia	1,000	1,000	1,000	5,000	2,000	8,000
Tasmania	20,000	24,000	18,000	514,000	591,000	476,000
Total Australia	42,000	49,000	40,000	1,061,000	895,000	875,000
New Zealand	2,000	(²)	(³)	34,000	. . .	(³)
Total Australasia	44,000	. . .	. . .	1,095,000	. . .	. . .

[1] Includes other pulse. [2] Less than 500 acres. [3] No official statistics.

TABLE 120.—*Beans: Wholesale price per bushel, 1900-1914.*

Date.	Boston.		Chicago.		Detroit.		San Francisco.	
	Pea.		Pea.		Pea.		Small white (per 100 lbs.).	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1900			$1.65	$2.25	$1.[illegible]	$2.10	$2.85	$4.50
1901	$2.00	$2.75	.90	2.80	1.66	2.40	2.00	5.00
1902	1.90	2.75	.85	2.40	1.28	1.78	3.50	4.65
1903	2.10	2.45	.90	2.40	1.82	2.35	2.40	3.40
1904	1.72½	2.20	.90	2.05	1.78	1.98	2.75	3.32½
1905	1.75	2.00	1.00	1.85	1.47	1.85	2.75	3.00
1906	1.50	1.80	1.10	1.65	1.27	1.61		. . .
1907	1.42	2.45	1.10	2.65	1.28	2.25	2.60	3.60
1908	2.30	2.75	1.65	2.70	2.00	2.65	3.40	4.75
1909	2.25	2.75	1.75	2.67	2.00	2.55	1.00	7.50
1910	2.25	2.70	1.85	2.78	1.92	2.40	3.25	4.85
1911	2.05	2.65	1.76	2.57	1.87	2.40	3.90	4.25
1912	2.55	3.10	1.90	3.29	2.15	2.70	4.00	4.80
1913	2.15	2.60	1.15	2.50	1.75	2.20	4.50	5.85
1914.								
January	2.15	2.20	1.60	2.15	1.85	1.85	5.00	5.50
February	2.10	2.20	1.75	2.10	1.82	1.90	5.00	5.50
March	2.10	2.15	1.75	2.00	1.80	1.92	5.10	5.50
April	2.15	2.20	1.75	2.25	1.85	2.10	5.00	5.25
May	2.30	2.35	2.00	2.30	2.05	2.10	4.75	5.15
June	2.15	2.30	1.95	2.25	1.85	2.07	4.75	5.10
July	2.15	2.25	1.95	2.20	1.85	1.97	4.75	5.10
August	2.35	3.10	1.95	3.10	1.97	2.90	5.25	6.00
September	2.65	3.00	2.25	3.00	2.10	2.76	4.50	5.50
October	2.40	2.65	2.00	2.60	2.00	2.27	4.00	4.50
November	2.60	2.80	2.25	2.90	2.25	2.45	4.50	4.70
December	2.75	2.80	2.35	2.60	2.50	2.65	4.50	4.60
Year	2.10	3.10	1.60	3.10	1.80	2.90	4.00	7.60

PEAS.

TABLE 121.—*Peas: Area and production of undermentioned countries, 1911–1913.*

Country.	Area.			Production.		
	1911	1912	1913	1911	1912	1913
NORTH AMERICA.	*Acres.*	*Acres.*	*Acres.*	*Bushels.*	*Bushels.*	*Bushels.*
United States	[1] 1,302,000	(2)	(2)	[1] 7,110,000	(2)	(2)
Canada.						
Prince Edward Island	(3)	(3)	(3)	2,000	2,000	2,000
Nova Scotia	(3)	(3)	(3)	5,000	5,000	7,000
New Brunswick	1,000	1,000	1,000	17,000	10,000	11,000
Quebec	33,000	30,000	26,000	517,000	449,000	451,000
Ontario	258,000	226,000	190,000	4,055,000	3,374,000	3,431,000
Manitoba	(3)	(3)	(3)	9,000	10,000	....
Saskatchewan	(3)	(3)	(3)	8,000	11,000	7,000
Alberta	(3)	(3)	(3)	8,000	9,000	8,000
British Columbia	1,000	1,000	1,000	45,000	43,000	35,000
Total Canada	295,000	260,000	219,000	4,666,000	3,913,000	3,952,000
Total	....	....	....	....	....	....
SOUTH AMERICA.						
Argentina	(2)	(2)	(2)	(2)	(2)	(2)
Chile [4]	27,000	29,000	35,000	322,000	528,000	501,000
EUROPE.						
Austria	(5)	(5)	(5)	(5)	(5)	(5)
Hungary [6]	33,000	(2)	(2)	418,000	(2)	(2)
Croatia-Slavonia [6]	12,000	(2)	(2)	171,000	(2)	(2)
Belgium [7]	12,000	12,000	(2)	417,000	409,000	(2)
France	73,000	73,000	(2)	1,134,000	1,277,000	(2)
Luxemburg [6]	2,000	2,000	2,000	31,000	24,000	28,000
Netherlands	55,000	64,000	68,000	1,838,000	1,868,000	(2)
Roumania [6]	34,000	46,000	61,000	598,000	678,000	1,076,000
Russia:						
Russia proper	....	....	(2)	....	....	....
Poland	....	....	(2)	....	....	....
Northern Caucasia	....	....	(2)	....	....	....
Total Russia (European)	3,484,000	3,472,000	(2)	32,962,000	41,916,000	....
Servia	3,000	(2)	(2)	71,000	70,000	(2)
Spain [4]	1,219,000	1,204,000	1,244,000	11,444,000	9,885,000	9,531,000
Sweden	44,000	(2)	(2)	1,277,000	1,069,000	1,317,000
United Kingdom:						
England	139,000	172,000	127,000	3,788,000	4,007,000	3,470,000
Wales	1,000	1,000	(3)	14,000	15,000	10,000
Scotland	(3)	(3)	(3)	13,000	18,00	5,000
Ireland	(3)	(3)	(3)	9,000	8,000	7,000
Total United Kingdom	141,000	174,000	128,000	3,824,000	4,048,000	3,492,000
ASIA.						
Japan	76,000	89,000	(2)	1,564,000	1,914,000	(2)
Russia (22 governments) [6]	133,000	127,000	(2)	993,000	1,045,000	(2)
AFRICA.						
Algeria	25,000	26,000	(2)	313,000	277,000	(2)
AUSTRALASIA.						
Australia	(5)	(5)	(5)	(5)	(5)	(5)
New Zealand	15,000	20,000	20,000	528,000	666,000	408,000

[1] Census figures for 1909.
[2] No official statistics.
[3] Less than 500 acres.
[4] Includes chick peas, lentils, and vetches.
[5] Included under beans.
[6] Includes lentils.
[7] Includes vetches.

SUGAR.

Table 122.—*Sugar: Production in the United States and its possessions, 1856–57 to 1914–15.*[1]

[Data for 1912–13 and subsequently Beet sugar, also Louisiana and Hawaii cane sugar, estimated by United States Department of Agriculture; Porto Rico, by Treasury Department of Porto Rico; Philippine Islands, exports for years ending June 30. For sources of data for earlier years, see Yearbook for 1912, p. 650. A short ton is 2,000 pounds.]

Year.	Beet sugar (chiefly refined).	Cane sugar (chiefly raw).					Total.
		Louisiana.	Other States.[2]	Porto Rico.	Hawaii.	Philippine Islands.	
Average:	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
1856–57 to 1860–61	......	132,402	5,978	75,304	....	46,446	260,130
1861–62 to 1865–66	269	74,036	1,945	71,765	....	54,499	202,508
1866–67 to 1870–71	448	44,768	3,818	96,114	....	81,485	226,633
1871–72 to 1875–76	403	67,341	4,113	87,606	(3)	119,557	279,020
1876–77 to 1880–81	470	104,920	5,327	76,579	27,040	180,067	393,403
1881–82 to 1885–86	692	124,868	7,280	87,441	76,075	189,277	485,633
1886–87 to 1890–91	1,922	163,049	8,439	70,112	125,440	186,129	555,091
1891–92 to 1895–96	19,406	268,655	6,834	63,280	162,538	286,629	807,142
1896–97 to 1900–1901	58,287	282,399	4,405	61,292	282,585	134,722	823,690
1901–2 to 1905–6	239,730	352,053	12,126	141,478	403,308	108,978	1,257,673
1906–7 to 1910–11	479,153	348,544	13,664	282,136	516,041	145,832	1,785,370
1901–2	184,606	360,277	4,048	103,152	355,611	75,011	1,082,705
1902–3	218,406	368,734	4,169	100,576	437,991	123,108	1,252,984
1903–4	240,604	255,894	22,176	138,096	367,475	82,855	1,107,100
1904–5	242,113	398,195	16,800	151,088	426,248	125,271	1,359,715
1905–6	312,920	377,162	13,440	214,480	429,213	138,645	1,485,860
1906–7	483,612	257,600	14,560	206,864	440,017	132,602	1,535,255
1907–8	463,628	380,800	13,440	230,095	521,123	167,242	1,776,328
1908–9	425,884	397,600	16,800	277,093	535,156	123,876	1,776,409
1909–10	512,469	364,000	11,200	346,786	517,090	140,783	1,892,328
1910–11	510,172	342,720	12,320	349,840	566,821	164,658	1,946,531
1911–12	599,500	352,874	8,000	371,076	595,038	205,046	2,131,534
1912–13	692,556	153,573	9,000	398,004	546,524	234,000	2,033,657
1913–14	733,401	292,698	7,800	[4] 364,000	612,000	235,000	2,244,899
1914–15 (preliminary)	722,054	242,700	3,920	....	....	....	....

[1] Census returns give production of beet sugar for 1899 as 81,729 short tons; for 1904, 253,921; 1909, 501,682; production of cane sugar in Louisiana for 1839, 59,974 short tons; 1849, 226,001 hogsheads; 1859, 221,726 hogsheads; 1869, 80,706 hogsheads; 1879, 171,706 hogsheads; 1889, 146,062 short tons; 1898, 278,497 short tons; 1899, 159,583; and 1909, 325,516 short tons; cane sugar in other States, 1839, 491 short tons; in 1849 21,576 hogsheads; in 1859, 9,256 hogsheads, in 1869, 6,337 hogsheads; in 1879, 7,166 hogsheads; in 1889, 4,580 short tons; in 1899, 1,691; and in 1909, 8,687 short tons.

[2] Includes Texas only, subsequent to 1902–3. Unofficial returns.

[3] Complete data not available for this period. Production in 1878–79, 1,254 short tons; in 1879–80, 1,304 short tons.

[4] Estimate of Willet and Gray.

SUGAR—Continued.

TABLE 123.—*Sugar beets and beet sugar: Production in the United States, 1901–1914.*

Year of beet crop, and State.	Number of factories.	Average length of campaign.	Sugar made (chiefly refined).	Sugar beets used. Area harvested.	Sugar beets used. Average yield per acre.	Sugar beets used. Quantity worked.	Sugar beets used. Average price per ton.	Analysis of beets. Percentage of sucrose.[1]	Analysis of beets. Purity coefficient.[2]	Recovery of sucrose.[3] Percentage of weight of beets.	Recovery of sucrose.[3] Percentage of total sucrose in beets.	Loss.[4]
	Number.	*Days.*	*Short tons.*	*Acres.*	*Short tons.*	*Short tons.*	*Dolls.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1901	36	88	184,606	175,083	9.63	1,685,689	4.50	14.8	82.20	10.95	73.99	3.85
1902	41	94	218,406	216,400	8.76	1,895,812	5.03	14.6	83.30	11.52	78.90	3.08
1903	49	75	240,604	242,576	8.56	2,076,494	4.97	15.1	......	11.59	76.75	3.51
1904	48	78	242,113	197,784	10.47	2,071,539	4.95	15.3	83.10	11.69	76.41	3.61
1905	52	77	312,921	307,364	8.67	2,665,913	5.00	15.3	83.00	11.74	76.73	3.56
1906	63	105	483,612	376,074	11.26	4,236,112	5.10	14.9	82.20	11.42	76.64	3.48
1907	63	89	463,628	370,984	10.16	3,767,871	5.20	15.8	83.60	12.30	77.85	3.59
1908	62	74	425,884	364,913	9.36	3,414,891	5.35	15.74	83.50	12.47	79.22	3.27
1909	65	83	512,469	420,262	9.71	4,081,382	......	16.10	84.10	12.56	78.01	3.54
1910	61	83	510,172	398,029	10.17	4,047,292	......	16.35	84.35	12.61	77.13	3.74
1911	66	94	599,500	473,877	10.68	5,062,333	5.50	15.89	......	11.84	74.51	4.05
1912	73	86	692,556	555,300	9.41	5,224,377	5.82	16.31	84.49	13.26	81.12	3.05
1913	71	85	733,401	580,006	9.76	5,659,462	5.69	15.78	83.22	12.96	82.13	2.82
1914	60	85	722,054	483,400	10.9	5,288,500	5.45	16.38	83.89	13.65	83.33	2.73
1914.												
California	10	97	160,004	104,000	10.4	1,082,000	5.68	18.46	82.70	15.62	84.62	2.84
Colorado	13	96	220,799	135,400	12.6	1,706,300	5.68	15.35	84.22	12.94	84.30	2.41
Idaho	4	78	39,613	25,300	10.5	264,400	4.96	17.78	87.74	14.98	84.25	2.80
Michigan	15	68	110,630	101,300	8.5	857,000	5.23	15.78	82.85	12.91	81.81	2.87
Ohio	3	56	21,425	17,800	10.4	184,700	5.04	14.50	83.82	11.60	80.00	2.90
Utah	7	100	78,619	41,300	13.7	564,600	4.79	17.03	85.60	13.92	81.74	3.11
Other States	8	76	81,964	58,300	10.8	629,500	5.67	15.80	83.35	13.02	82.41	2.78
United States	60	85	722,054	483,400	10.9	5,288,500	5.45	16.38	83.89	13.65	83.33	2.73

[1] Based upon weight of beets.
[2] Percentage of sucrose (pure sugar) in the total soluble solids of the beets.
[3] Percentage of sucrose actually extracted by factories.
[4] Percentage of sucrose (based upon weight of beets) remaining in molasses and pulp.

TABLE 124.—*Cane-sugar production of Louisiana, 1911–1914.*

Parish.	Factories in operation. 1911	1912	1913	1914	Sugar made. 1911	1912	1913	1914	Cane used for sugar. 1911	1912	1913	1914
	No.	*No.*	*No.*	*No.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Ascension	7	7	4	3	14,496	8,342	10,806	5,800	234,719	124,934	163,000	84,000
Assumption	23	16	17	17	35,950	14,457	28,664	22,500	673,263	243,864	462,000	331,000
Iberia	13	9	10	7	29,949	10,909	15,925	8,000	464,491	140,932	204,000	97,000
Iberville	18	11	14	15	23,759	7,942	19,187	18,900	481,545	141,581	315,000	283,000
Lafourche	16	9	13	13	42,001	11,728	35,021	34,300	707,764	191,714	535,000	447,000
St. James	20	10	17	16	20,760	9,368	19,970	16,900	361,537	192,537	327,000	258,000
St. John	8	5	8	8	14,935	11,289	13,596	13,900	275,536	161,790	236,000	207,000
St. Martin	4	3	3	3	13,719	5,382	8,114	5,000	197,614	62,165	103,000	56,000
St. Mary	26	15	22	20	57,602	25,597	54,689	38,000	866,744	291,387	663,000	481,000
Terrebonne	14	14	13	13	27,462	14,463	24,631	28,900	442,218	191,984	352,000	295,000
West Baton Rouge	10	10	10	11	17,235	9,328	15,305	16,300	314,472	127,196	225,000	214,000
Lafayette and Vermilion	5	6	6	6	23,490	14,547	23,104	14,900	336,427	164,580	276,000	183,000
Other[1]	24	11	16	17	31,526	10,131	23,684	24,300	530,962	127,910	353,000	323,000
Total Louisiana	188	126	153	149	352,874	153,573	292,698	242,700	5,887,292	2,162,574	4,214,000	3,199,000

[1] Avoyelles, Rapides, St. Landry, East Baton Rouge, Pointe Coupee, West Feliciana, Jefferson, Orleans, Plaquemines, and St. Charles.

NOTE.—*The average yield of cane per acre in Louisiana was 19 tons in 1911, 11 in 1912, 17 in 1913, and 15 in 1914.*

SUGAR—Continued.

TABLE 125.—*Cane-sugar production of Hawaii, 1912–1914.*

[Figures for 1914 are subject to revision.]

Island, and year ending Sept. 30.	Factories in operation.	Average length of campaign.	Sugar made.	Cane used for sugar.			Average extraction of sugar.		
				Area harvested.	Average yield per acre.	Production.	Per cent of cane.	Per short ton of cane.	Per acre of cane.
	No.	*Days.*	*Short tons.*	*Acres.*	*Short tons.*	*Short tons.*	*Per cent.*	*Pounds.*	*Pounds.*
Hawaii:									
1914	23	174	213,000	51,000	36	1,854,000	11.49	230	8,353
1913	24	170	197,212	53,600	32	1,703,000	11.58	232	7,364
1912	24	204	209,914	52,900	34	1,799,000	11.67	233	7,930
Kauai:									
1914	9	214	121,000	21,600	50	1,089,000	11.11	222	11,204
1913	9	198	100,340	20,800	42	841,000	11.93	239	9,605
1912	9	206	96,845	18,900	43	807,000	12.00	240	10,248
Maui:									
1914	7	167	145,000	19,400	54	1,054,000	13.76	275	14,948
1913	7	152	124,820	19,700	47	929,000	13.44	269	12,684
1912	7	192	148,740	19,400	55	1,074,000	13.86	277	15,334
Oahu:									
1914	7	188	133,000	20,700	44	903,000	14.73	295	12,850
1913	10	157	124,152	20,500	49	1,003,000	12.38	248	12,153
1912	10	200	139,539	21,800	50	1,094,000	12.75	255	12,802
Territory of Hawaii:									
1914	46	183	612,000	112,700	43	4,900,000	12.49	250	10,861
1913	50	169	546,524	114,600	39	4,476,000	12.21	244	9,544
1912	50	200	595,038	113,000	42	4,774,000	12.46	249	10,532

TABLE 126.—*Sugar: Wholesale price per pound, on New York market, 1900–1914.*

Date.	Raw.				Refined.									
	Molasses, 89° polarization.[1]		Centrifugal, 96° polarization.		Cut loaf.		Powdered.		Granulated, fine or standard.		Soft sugar No. 1.		Soft sugar No. 15.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
1900	3.81	4.88	4.25	5.00	5.35	6.55	5.05	6.25	4.95	6.15	4.60	5.80	4.15	5.20
1901	3.16	3.88	3.62	4.38	5.15	6.10	4.75	5.70	4.85	5.60	4.30	5.25	3.05	4.60
1902	2.44	3.50	3.25	4.00	5.05	5.55	4.55	5.05	4.45	4.95	4.20	4.70	3.65	4.15
1903	3.00	3.44	3.50	3.94	4.95	5.60	4.55	5.10	4.45	5.00	4.20	4.75	3.65	4.20
1904	2.81	4.39	3.31	4.88	5.10	6.45	4.50	5.85	4.40	5.75	4.15	5.40	3.60	4.60
1905	2.75	4.75	3.75	5.25	5.30	6.85	4.70	6.25	4.60	6.15	4.25	5.80	3.55	5.00
1906	2.62	3.56	3.33	4.25	5.20	5.70	4.60	5.10	4.50	5.00	4.25	4.70	3.65	4.05
1907	2.88	3.63	3.38	3.98	5.40	5.70	4.80	5.10	4.70	5.00	4.45	4.75	3.85	4.15
1908	3.17	3.92	3.67	4.48	5.45	6.30	4.75	5.60	4.65	5.50	4.40	5.25	3.80	4.65
1909	2.86	3.70	3.61	4.45	5.35	6.10	4.65	5.40	4.55	5.30	4.30	5.05	3.70	4.45
1910	3.05	3.73	3.80	4.48	5.40	6.05	4.70	5.35	4.60	5.25	4.35	5.10	3.75	4.50
1911	2.67	5.21½	3.42	5.96	5.40	7.55	4.70	6.85	4.60	6.80	4.45	6.60	3.85	6.00
1912	2.98¾	4.05	3.73	4.80	5.70	6.65	5.00	5.90	4.90	5.85	4.65	5.65	4.05	5.05
1913	2.37⅝	3.05	3.12	3.80	5.05	5.70	4.25	5.00	4.15	4.95	4.00	4.65	3.40	4.05
1914.														
January	2.62½	2.98	3.12½	3.48	5.05	5.25	4.15	4.25	4.05	4.20	3.90	4.05	3.30	3.45
February	2.89	2.98	3.39	3.48	5.05	5.05	4.20	4.20	4.10	4.15	3.95	3.95	3.35	3.35
March	2.28	2.64	2.95	3.39	5.05	5.10	3.95	4.20	3.85	4.15	3.80	3.95	3.00	3.35
April	2.27	2.39	2.92	3.04	5.05	5.10	4.00	4.00	3.90	3.95	3.65	3.65	3.05	3.05
May	2.39	2.74	3.00	3.39	5.05	5.15	4.00	4.30	3.90	4.25	3.65	4.00	3.05	3.40
June	2.64	2.80	3.29	3.45	5.15	5.25	4.30	4.40	4.20	4.35	4.00	4.10	3.40	3.50
July	2.61	2.67	3.26	3.32	5.25	5.30	4.40	4.50	4.30	4.45	4.10	4.20	3.50	3.60
August	2.64	5.87	3.29	6.52	5.30	8.40	4.50	7.60	4.40	7.55	4.20	7.30	3.60	6.70
September	4.37	5.62	5.02	6.27	7.65	8.15	6.85	7.35	6.75	7.30	6.50	7.05	5.90	6.45
October	2.99	4.37	3.64	5.02	6.50	7.65	5.70	6.85	5.60	6.80	5.35	6.50	4.75	5.90
November	2.86	3.42	3.51	4.07	5.90	6.50	5.10	5.70	5.00	5.65	4.75	5.35	4.15	4.75
December	3.24	3.43	3.89	4.08	5.75	6.00	4.95	5.20	4.85	5.15	4.60	4.85	4.00	4.25
Year	2.27	5.87	2.92	6.52	5.05	8.40	3.95	7.60	3.85	7.55	3.60	7.30	3.00	6.70

[1] Muscovado, 89° polarization, 1900 to 1908 inclusive.

SUGAR—Continued.

TABLE 127.—*Sugar: International trade, calendar years 1911–1913.*

[The following kinds and grades have been included under the head of sugar: Brown, white, canqied, *caramel, chancaca (Peru), crystal cube, maple, muscovado, panela. The following have been excluded:* "Candy" (meaning confectionery), confectionery, glucose, grape sugar, jaggery, molasses, and sirup. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Argentina	150	228	132	Martinique	78,204	86,991	86,991
Austria-Hungary	1,334,958	1,540,900	2,368,765	Mauritius	522,601	454,550	454,550
Barbados	61,699	57,902	57,902	Netherlands	432,359	474,368	440,817
Belgium	360,159	348,081	251,935	Peru	[1] 270,848	328,902	315,041
Brazil	79,825	10,520	11,832	Philippine Islands	460,078	434,475	346,858
British Guiana	222,588	174,319	174,319	Reunion	111,181	58,812	58,812
British India	44,184	80,454	53,181	Russia	1,000,127	830,036	325,665
China	33,586	43,154	14,555	Santo Domingo	193,499	195,714	173,832
Cuba	3,192,649	4,357,051	5,476,901	Trinidad and Tobago	84,979	74,290	74,290
Dutch East Indies	2,952,302	2,942,217	2,942,217	United Kingdom	64,011	67,012	52,492
Egypt	23,817	20,769	11,316	Other countries	530,836	701,564	743,810
Fiji	163,146	138,271	138,271				
France	293,732	373,858	442,518	Total	14,440,142	14,833,063	17,563,904
Germany	1,890,046	953,743	2,462,020				
Guadeloupe	82,658	84,882	84,882				

IMPORTS.

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
Argentina	114,596	66,658	166,578	Netherlands	204,365	178,137	147,002
Australia	74,537	220,597	167,690	New Zealand	123,958	135,902	137,790
British India	1,272,141	1,364,955	1,922,009	Norway	106,228	98,505	115,903
British South Africa	74,707	39,728	60,480	Persia	222,408	234,308	234,308
Canada	599,767	651,875	670,234	Portugal	82,061	78,867	78,867
Chile	190,970	149,486	196,888	Singapore	127,967	224,829	224,829
China	575,434	607,287	948,230	Switzerland	230,862	268,289	258,513
Denmark	25,478	31,144	26,888	Turkey[1]	445,111	445,111	445,111
Egypt	100,896	77,277	72,609	United Kingdom	3,718,860	3,693,670	3,872,309
Finland	98,181	103,818	105,106	United States[2]	4,134,206	4,316,975	4,762,014
France	385,093	672,273	246,027	Uruguay[3]	57,087	57,087	57,087
Italy	20,836	15,768	15,446	Other countries	669,730	734,670	778,668
Japan	175,271	303,093	303,093	Total	13,830,750	14,770,311	16,013,679

[1] Data for 1910.
[2] Not including receipts from Hawaii, amounting in 1911, to 1,135,714,939; 1912, 1,205,465,510; and 1913, 1,085,362,344 pounds; and from Porto Rico, in 1911, 653,819,757; 1912, 734,289,872; and 1913, 765,420,310 pounds
[3] Data for 1908.

SUGAR—Continued.

TABLE 128.—*Sugar crop of undermentioned countries, 1911–12 to 1913–14.*

Country.	1911–12	1912–13	1913–14
CANE SUGAR.			
NORTH AMERICA.	*Short tons.*	*Short tons.*	*Short tons.*
United States:			
Contiguous—			
Louisiana	353,000	154,000	293,000
Texas[1]	8,000	9,000	7,000
Noncontiguous—			
Hawaii	595,000	547,000	612,000
Porto Rico	371,000	398,000	364,000
Total United States	1,327,000	1,108,000	1,276,000
Central America:			
British Honduras	(2)	(2)	(2)
Costa Rica	4,000	3,000	3,000
Nicaragua	2,000	4,000	4,000
Salvador	19,000	24,000	24,000
Mexico[1]	167,000	164,000	143,000
West Indies:			
British—			
Antigua[3]	13,000	13,000	13,000
Barbados	30,000	32,000	32,000
Jamaica[3]	22,000	11,000	19,000
St. Christopher-Nevis	12,000	12,000	12,000
St. Lucia[3]	5,000	5,000	5,000
Trinidad and Tobago	46,000	46,000	46,000
Cuba	2,142,000	2,737,000	2,909,000
Danish[3]	11,000	7,000	6,000
French—			
Guadeloupe[3]	39,000	36,000	45,000
Martinique[3]	44,000	45,000	43,000
Santo Domingo[3]	94,000	98,000	87,000
Total	2,650,000	3,237,000	3,391,000
SOUTH AMERICA.			
Argentina	199,000	162,000	304,000
Brazil	263,000	228,000	228,000
Guiana:			
British[3]	111,000	87,000	114,000
Dutch	11,000	15,000	16,000
Peru	191,000	207,000	212,000
Total	775,000	699,000	874,000
EUROPE.			
Spain	22,000	18,000	11,000
ASIA.			
British India	2,745,000	2,894,000	2,534,000
Federated Malay States:			
Perak[4]	13,000	13,000	13,000
Formosa	194,000	127,000	213,000
Japan	69,000	69,000	69,000
Java	1,550,000	1,616,000	1,501,000
Philippine Islands[5]	206,000	234,000	235,000
Total	4,776,000	4,953,000	4,655,000
CANE SUGAR—Con.			
AFRICA.	*Short tons.*	*Short tons.*	*Short tons.*
Egypt	65,000	84,000	75,000
Mauritius	187,000	239,000	271,000
Natal	103,000	93,000	96,000
Portuguese E. Africa	31,000	34,000	38,000
Reunion	45,000	29,000	45,000
Total	431,000	479,000	525,000
OCEANIA.			
Australia.			
Queensland	194,000	127,000	263,000
New South Wales	19,000	19,000	22,000
Fiji	81,000	77,000	112,000
Total	294,000	223,000	397,000
Total cane sugar	10,253,000	10,699,000	11,118,000
BEET SUGAR.			
NORTH AMERICA.			
U. S. Contiguous	600,000	693,000	733,000
Canada	12,000	14,000	[1] 10,000
Total	612,000	707,000	743,000
EUROPE.			
Austria-Hungary	1,263,000	2,006,000	1,858,000
Belgium	259,000	309,000	249,000
Bulgaria	8,000	....	9,000
Denmark	128,000	148,000	178,000
France	502,000	953,000	881,000
Germany	1,552,000	2,902,000	2,886,000
Italy	175,000	219,000	337,000
Netherlands	265,000	309,000	253,000
Roumania	36,000	38,000	38,000
Russia	2,025,000	1,314,000	2,031,000
Spain	103,000	190,000	170,000
Sweden	140,000	146,000	151,000
Switzerland	4,000	4,000	5,000
Total	6,460,000	8,658,000	9,032,000
Total beet sugar	7,072,000	8,365,000	9,765,000
Total beet and cane sugar	17,325,000	19,064,000	20,883,000

[1] Unofficial estimates.
[2] *Less than 500 short tons.*
[3] Exports.
[4] Average, 1907–1909.
[5] Exports, years ending June 30, 1912, 1913, 1914.

NOTE.—1 short ton = 2,000 pounds.

SUGAR—Continued.

TABLE 129.—*Sugar: Total production of countries mentioned in Table 128, 1895–96 to 1913–14.*

Year.	Production.			Year.	Production.		
	Cane.[1]	Beet.	Total.		Cane.[1]	Beet.	Total.
	Short tons.	*Short tons.*	*Short tons.*		*Short tons.*	*Short tons.*	*Short tons.*
1895–96	3,259,000	4,832,000	8,091,000	1905–6	7,551,000	8,090,000	15,641,000
1896–97	3,171,000	5,549,000	8,720,000	1906–7	8,365,000	7,587,000	15,952,000
1897–98	3,206,000	5,457,000	8,663,000	1907–8	7,926,000	7,390,000	15,316,000
1898–99	3,355,000	5,616,000	8,971,000	1908–9	8,654,000	7,350,000	16,004,000
1899–1900	3,389,000	6,262,000	9,651,000	1909–10	9,423,000	6,991,000	16,414,000
1900–1901	4,084,000	6,795,000	10,879,000	1910–11	9,540,000	9,042,000	18,582,000
1901–2	6,818,000	7,743,000	14,561,000	1911–12	10,453,000	7,096,000	17,549,000
1902–3	6,782,000	6,454,000	13,236,000	1912–13	10,719,000	9,410,000	20,129,000
1903–4	6,909,000	6,835,000	13,744,000	1913–14[2]	....	9,921,000	....
1904–5	7,662,000	5,525,000	13,187,000				

[1] Prior to 1901–2, these figures include exports instead of production for British India.
[2] Preliminary.

TEA.

TABLE 130.—*Tea: International trade, calendar years 1911–1913.*

["Tea" includes tea leaves only, and excludes dust, sweepings, and *yerba maté*. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
British India	265,270	279,230	291,583	Japan	37,096	35,116	35,116
Ceylon	186,504	192,020	192,020	Singapore	2,676	2,913	2,913
China	194,552	196,488	192,122	Other countries	8,057	8,236	6,015
Dutch East Indies	38,460	66,610	66,610				
Formosa	25,620	23,668	23,931	Total	758,835	804,281	810,310

IMPORTS.

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
Argentina	3,672	4,082	4,148	Germany	8,405	9,124	9,458
Australia	34,759	36,756	37,349	Netherlands	11,466	12,143	12,052
Austria-Hungary	3,551	3,793	3,575	New Zealand	8,071	7,684	7,069
British India	10,748	9,167	8,653	Persia	9,443	11,120	11,120
British South Africa	5,534	6,115	6,567	Russia	153,288	151,037	152,211
Canada	33,425	42,658	35,927	Singapore	6,225	6,692	[1] 6,692
Chile	3,625	3,812	3,849	United Kingdom	293,502	295,409	305,690
China	16,630	18,445	25,898	United States	104,166	98,706	89,018
Dutch East Indies	6,276	7,624	7,624	Other countries	33,214	38,496	36,292
France	2,972	2,896	2,661				
French Indo-China	2,680	2,920	2,920	Total	751,652	768,659	768,773

TEA—Continued.

TABLE 131.—*Tea: Wholesale price per pound, on New York market, 1900–1914.*

Date	Foochow, fair to fine.		Formosa, fine to choice.		Japans, pan-fired.		India orange pekoe.		Ceylon orange pekoe.	
	Low.	*High.*	*Low.*	*High.*	*Low.*	*High.*	*Low.*	*High.*	*Low.*	*High.*
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
1900	22	28	27	45	.....	.....	27	30	27	37
1901	20	28	27	43	.....	.....	26	30	26	37
1902	21½	29	27½	47	18	33	26	35	26	36
1903	10	29	20½	50	8	33	19	35	19	36
1904	9	18	25	50	9½	14	18	25	18	27
1905	9	18	26	50	11	14	19	25	19	28
1906	8½	18	22	50	9½	16	19	25½	19	28
1907	9½	21	22	36	14½	36	15	25½	16	30
1908	12½	21	20	45	18	35	17	25	18	30
1909	12½	27	20	40	18	38	18	26	18	28
1910	10½	27	23	64½	17½	38	18	26½	18	26
1911	10	22¾	23½	45½	17	32	18	26¾	18	26
1912	11½	22½	20	39	15	21	18	25	20	26
1913	12	22	24	39	13½	35	18½	24	18½	24
1914.										
January	12	22	24	39	13½	28	18½	21	18½	24
February	12	22	24	39	13½	28	18½	21	18½	24
March	12	22	24	39	12½	30	18½	21	18½	24
April	12	22	24	39	12½	30	18½	21	18½	24
May	12½	22	24	39	12½	30	18½	21	18½	24
June	12½	22	24	39	12½	30	18½	21	18½	24
July	12½	22	24	39	12½	31	18½	21	18½	24
August	12½	22	24	39	14	38	18½	27	18½	26
September	16	22	24	39	17	38	27	27	25	26
October	15	22	23	39	18	38	27	27	20	26
November	15	22	23	39	18	38	.....	.....	20	22
December	15	22	23	39	18	38	.....	.....	21	22
Year	12	22	23	39	12½	38	18½	27	18½	26

COFFEE.

TABLE 132.—*Coffee: International trade, calendar years 1911–1913.*

[The item of coffee comprises unhulled and hulled, roasted, ground, or otherwise prepared, but imitation or "surrogate" coffee and chicory are excluded. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*
Belgium	28,113	53,036	24,945
Brazil	1,489,341	1,597,950	1,754,973
British India	*24,593*	*34,937*	*22,073*
Colombia	83,554	123,442	123,442
Costa Rica	27,869	26,980	28,702
Dutch East Indies	*52,517*	*75,179*	*75,179*
Guatemala	90,003	82,855	93,014
Haiti	52,861	78,894	57,594
Jamaica	*6,726*	*10,034*	*10,034*
Mexico	41,587	53,759	53,759
Netherlands	195,902	180,792	202,823
Nicaragua	[1]12,973	10,201	10,201
Salvador	*[1]65,367*	*59,210*	*63,471*
Singapore	4,365	4,842	4,842
United States[2]	36,384	49,716	52,905
Venezuela	*97,659*	*117,042*	*142,016*
Other countries	62,961	66,047	62,686
Total	*2,372,775*	*2,624,892*	*2,782,659*

IMPORTS.

Country.	1911	1912	1913 (prelim.).
Argentina	24,482	31,063	32,602
Austria-Hungary	*127,196*	*124,537*	*130,909*
Belgium	93,177	110,434	118,195
British South Africa	24,954	26,004	26,910
Cuba	*24,779*	*22,292*	*25,108*
Denmark	32,208	31,637	36,091
Egypt	15,148	15,774	13,975
Finland	*28,255*	*28,331*	*28,371*
France	244,842	245,243	254,155
Germany	404,035	376,869	371,131
Italy	*58,391*	*60,921*	*63,196*
Netherlands	289,273	256,288	319,572
Norway	29,431	25,907	29,931
Russia	25,219	25,968	27,590
Singapore	5,573	6,527	6,527
Spain	28,336	29,500	32,013
Sweden	71,845	67,667	67,667
Switzerland	23,707	23,942	25,470
United Kingdom	28,029	27,987	28,100
United States	*800,209*	*942,515*	*852,529*
Other countries	101,006	106,755	112,912
Total	*2,480,095*	*2,586,161*	*2,603,005*

[1] Data for 1910.

[2] Chiefly from Porto Rico.

COFFEE—Continued.

TABLE 133.—*Coffee: Wholesale price per pound, on the New York and New Orleans markets, 1900–1914.*

Date.	New York.												New Orleans.			
	Rio No. 7.		Santos No. 7.		Mocha.		Padang.		Cucuta, washed.		Mexican Cordoba, washed.		Rio No. 7.		Santos No. 7.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
1900	6¼	10	6¾	10	16	19¾	18	25¼	9	13½	9	14	6⅛	10	7	10⅛
1901	5½	7¾	5½	7¾	15½	19½	15	19	7½	13	8	12¼	5¾	7⅞	5¼	8
1902	5	7¾	5	7¼	13	19	17	19	8	13½	8¾	12¾	5⅝	7¼	5⅛	7⅝
1903	5 1/16	7⅞	5 1/16	7⅜	12	19	15½	17	8	13	8	13	5¾	7⅜	5½	6⅞
1904	6¼	9 7/16	6¼	9 7/16	13	18	15½	16½	9	13¾	8¾	13½	7	9¼	....	....
1905	7½	9⅛	7½	9⅛	16	18½	15	16	9	13	10¼	13	7½	9	7⅞	9
1906	6¾	9	6¾	9	15	21	13	15½	9¼	12	9¼	12¾	7⅜	8⅝	7⅛	8⅞
1907	6	7¼	6	7¼	15½	19	13	21	9⅜	13¾	9¼	13	6	7⅛	6⅞	7⅞
1908	6	7⅛	6	7⅛	14½	19	10	21	10	13½	10¼	13	5⅝	6⅝	7	7⅞
1909	6½	8⅝	6¼	8¾	14	17	10	20½	9⅜	14	10¼	13½	7⅜	8⅝	7⅛	8⅞
1910	8	13½	8¼	13⅝	14¼	17⅛	17	20	10	16⅛	10½	15½	8¼	13½	8⅝	13⅝
1911	11¾	16⅛	12⅛	16½	15¼	20	18½	22	13¾	18	14¼	18¼	11⅜	16⅜	12⅛	16⅝
1912	13½	15¼	14¼	16¼	18½	21	19½	22	15⅛	18½	15½	18½	13⅜	15¼	14¼	16⅝
1913	8⅛	14	10⅜	15¾	18	21	19	23	11¼	17¾	15	18	9	14	10½	15
1914.																
January	9	9⅝	10⅜	11¾	18	20	21	23	14½	18	15¾	16½	9¼	9¾	10⅝	11½
February	9⅛	9½	10¾	11¾	17½	20½	21	23	15⅛	18	15¾	16½	9⅛	9⅜	10¾	11⅞
March	8½	9¼	10¼	11	17½	20½	21	23	14¼	17½	15¼	16½	8⅞	9⅜	10½	11
April	8¾	9⅛	10½	11	18½	20¾	21	23	14¼	17	15¼	15¾	8⅝	9⅛	10½	11⅛
May	8¾	9	10¾	11	18¼	20½	21	23	14½	16¾	15¼	15¾	8⅝	9¼	10½	11¼
June	8⅝	9⅝	10¼	11½	18½	21	21	23	14½	16¼	15¼	16	8⅝	9⅝	10¾	11½
July	7⅜	9	9¾	10¼	19½	21	21	23	14¼	16½	15	16	7⅜	9	9¼	11⅛
August	7⅛	9⅞	9¾	12¾	19¾	30	21	24	14¼	18¼	15	17½	7¼	10⅜	10½	13⅝
September	6⅝	7⅞	9	11	22¼	30	23	24	12	16	15½	17¼	6⅞	7⅞	9¾	11⅜
October	6¼	6⅝	8½	9¼	22½	30	23	24	11	15	12½	15½	6⅝	6¾	8¾	9⅝
November	6¼	6⅞	8¼	8¾	21½	30	22½	24	11½	14½	12	14	6⅝	6¾	8⅞	9
December	6½	7⅜	8½	8¾	21½	24	22½	23½	12	15¼	12	14	6⅝	7¼	8⅝	9⅜
Year	6¼	9⅞	8¼	12¾	17½	30	21	24	11	18¼	12	17¼	6⅝	10⅜	8¾	13½

OIL CAKE AND OIL-CAKE MEAL.

TABLE 134.—*Oil cake and oil-cake meal: International trade, calendar years 1911–1913.*

[The class called here "oil cake and oil-cake meal" includes the edible cake and meal remaining after making oil from such products as cotton seed, flaxseed, peanuts, corn, etc. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Argentina	44,594	38,849	46,191	Italy	89,539	57,795	43,008
Austria-Hungary	158,739	127,061	111,252	Mexico	41,568	40,138	40,138
Belgium	174,257	157,458	125,241	Netherlands	210,956	253,003	228,492
British India	301,128	333,503	400,818	Russia	1,452,291	1,552,042	1,611,823
Canada	36,946	69,353	65,530	United Kingdom	46,337	69,512	52,741
China	147,065	112,629	175,060	United States	1,638,537	1,980,166	1,952,184
Denmark	16,218	21,742	21,061	Other countries	77,046	80,677	88,926
Egypt	187,772	178,083	138,839				
France	560,172	471,101	473,550	Total	5,697,651	6,124,895	6,223,390
Germany	514,189	581,182	648,536				

IMPORTS.

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
Austria-Hungary	48,058	74,091	79,860	Japan	195,154	190,495	190,495
Belgium	529,596	534,293	567,391	Netherlands	643,155	822,757	766,498
Canada	6,662	10,594	11,090	Norway	63,453	65,400	66,519
Denmark	948,133	1,114,414	1,250,972	Sweden	357,198	385,474	385,474
Dutch East Indies	2,230	38	33	Switzerland	88,451	75,158	54,955
Finland	25,598	32,071	25,533	United Kingdom	754,779	863,621	904,606
France	314,806	341,642	223,862	Other countries	25,595	[1] 20,616	20,216
Germany	1,608,390	1,750,872	1,826,618				
Italy	11,872	8,627	6,520	Total	5,683,110	6,290,163	6,330,647

ROSIN.

TABLE 135.—*Rosin: International trade, calendar years 1911–1913.*

[For rosin, only the resinous substance known as "rosin" in the exports of the United States, is taken. See "General note," p. 518]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Austria-Hungary	1,988	2,388	2,327	Spain	19,500	25,068	20,533
Belgium	46,346	60,312	57,491	United States	676,323	680,777	729,419
Germany	52,354	37,609	56,884	Other countries	225	2,302	3,434
Greece	17,202	14,061	3,982				
Netherlands	62,976	61,698	59,713	Total	924,340	933,722	969,361
Russia	47,317	49,507	55,578				

IMPORTS.

Argentina	30,674	32,005	43,906	Japan	10,235	11,501	11,501
Australia	15,064	13,007	16,924	Netherlands	78,443	83,794	79,452
Austria-Hungary	80,866	82,270	74,208	Norway	6,537	6,281	7,987
Belgium	79,432	73,957	62,426	Roumania [2]	6,556	6,556	6,556
Brazil [1]	33,920	33,920	33,920	Russia	73,782	68,047	79,903
British India	5,510	7,358	5,705	Servia [2]	586	586	586
Canada	25,797	26,381	28,462	Spain	1,960	739	689
Chile	7,745	7,129	3,801	Switzerland	4,989	5,383	5,209
Cuba	3,554	6,240	4,771	United Kingdom	158,346	176,844	187,934
Denmark	3,170	3,329	3,513	Uruguay [3]	5,837	5,837	5,837
Dutch East Indies	8,728	23,474	23,474	Other countries	15,100	16,987	17,140
Finland	7,795	5,126	7,594				
Germany	246,054	250,181	212,226	Total	947,620	984,151	983,732
Italy	36,951	37,569	39,918				

[1] Data for 1909. [2] Data for 1911. [3] Data for 1908.

TURPENTINE.

TABLE 136.—*Turpentine (spirits): International trade, calendar years 1910–1912.*

["Spirits of turpentine" includes only "spirits" or "oil" of turpentine and, for Russia, *skipidar;* it excludes crude turpentine, pitch, and, for Russia, *terpentin.* See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1910	1911	1912 (prelim.).
	Gallons.	*Gallons.*	*Gallons.*		*Gallons.*	*Gallons.*	*Gallons.*
Belgium	2,157	1,871	1,673	Spain	1,126	1,006	1,331
France	2,657	2,071	3,517	United States	18,198	20,811	20,018
Germany	420	494	578	Other countries	713	750	471
Netherlands	2,288	3,471	4,112				
Russia	2,698	2,336	2,393	Total	30,257	32,909	34,113

IMPORTS.

Argentina	617	607	698	New Zealand	241	216	200
Australia	859	681	524	Russia	275	288	356
Austria-Hungary	2,818	2,775	2,668	Sweden	131	132	132
Belgium	3,612	3,054	2,904	Switzerland	441	466	592
Canada	1,123	1,315	1,253	United Kingdom	7,154	9,837	8,356
Chile	261	225	160	Other countries	1,351	1,186	1,142
Germany	8,367	9,325	10,728				
Italy	967	993	1,061	Total	31,392	36,070	36,946
Netherlands	3,475	4,970	6,064				

INDIA RUBBER.

TABLE 137.—*India rubber: International trade, calendar years 1911–1913.*

[Figures for india rubber include "india rubber," so called, and *caoutchouc*, *caucho*, *jebe* (Peru), *hule* (Mexico), *borracha*, *massaranduba*, *mangabeira*, *maniçoba*, *sorva* and *seringa* (Brazil), *gomelastiek* (Dutch East Indies), *caura*, *sernambi* (Venezuela). See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Angola	7,209	5,595	5,595	Ivory Coast	2,785	3,034	3,034
Belgian Kongo	7,499	7,737	7,737	Kamerun	15,571	6,197	2,608
Belgium	20,209	24,608	24,456	Mexico	16,378	12,197	12,197
Bolivia	8,037	8,994	8,994	Netherlands	7,046	8,686	12,368
Brazil	80,572	93,224	79,876	Peru	5,842	7,039	6,131
Dutch East Indies	6,833	5,945	5,945	Senegal	467	457	457
Ecuador [1]	1,210	1,210	1,210	Singapore	2,973	8,472	8,472
France	23,057	24,588	23,561	Southern Nigeria	2,164	1,579	1,579
French Guiana	4,226	4,499	4,490	Venezuela	807	990	527
French Kongo	3,122	4,191	4,191	Other countries	40,150	68,749	68,423
Germany	10,122	10,898	8,756				
Gold Coast	2,669	1,991	1,991	Total	269,038	310,880	292,607

IMPORTS.

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
Austria-Hungary	6,763	7,841	7,975	Russia	14,894	20,600	28,096
Belgium	24,657	30,138	32,492	United Kingdom	37,488	41,942	56,617
Canada	3,700	5,498	4,802	United States	82,852	118,058	115,881
France	34,945	37,080	38,448	*Other countries*	12,795	16,207	17,745
Germany	44,002	45,385	45,188				
Italy	5,335	7,704	6,271	Total	277,711	342,309	371,238
Netherlands	10,280	11,856	17,723				

[1] Date for 1911.

SILK.

TABLE 138.—*Production of raw silk in undermentioned countries, 1909–1913.*

[Estimates of the Silk Merchants' Union of Lyons, France.]

Country.	1909	1910	1911	1912	1913 (prelim.).
Western Europe:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Italy	9,372,000	8,702,000	7,694,000	9,050,000	7,804,000
France	1,486,000	701,000	886,000	1,113,000	772,000
Spain	181,000	183,000	194,000	172,000	161,000
Austria } Hungary }	833,000	776,000	772,000	{ 410,000	315,000
				{ 238,000	264,000
Total	11,872,000	10,362,000	9,546,000	10,983,000	9,336,000
Levant and Central Asia:					
Broussa and Anatolia	1,166,000	1,058,000	1,290,000	844,000	904,000
Syria and Cyprus	981,000	1,100,000	1,157,000	882,000	1,080,000
Other Provinces of Asiatic Turkey	278,000	287,000	353,000	254,000	287,000
Turkey-in-Europe[1]	....	....	....	573,000	187,000
Salonica and Adrianople	838,000	794,000	827,000	....	....
Balkan States (Bulgaria, Servia, and Roumania)	492,000	386,000	375,000	320,000	275,000
Greece, Salonica, and Crete	132,000	126,000	137,000	110,000	463,000
Caucasus	1,190,000	1,146,000	1,058,000	871,000	849,000
Persia (exports) } Turkestan (exports)[2] }	1,323,000	1,186,000	1,329,000	{ 500,000	463,000
				{ 569,000	496,000
Total	6,698,000	6,173,000	6,526,000	4,923,000	5,004,000
Far East:					
China—					
Exports from Shanghai	11,431,000	11,446,000	13,095,000	14,198,000	12,787,000
Exports from Canton	5,059,000	5,814,000	3,814,000	4,982,000	6,129,000
Japan—					
Exports from Yokohama	18,457,000	19,698,000	20,657,000	23,957,000	26,125,000
British India—					
Exports from Bengal and Cashmere	518,000	507,000	494,000	260,000	220,000
Indo-China—					
Exports from Saigon, Haiphong, etc	....	....	35,000	33,000	33,000
Total	35,465,000	37,467,000	38,095,000	43,430,000	45,294,000
Grand total	54,035,000	54,002,000	54,167,000	59,336,000	59,634,000

[1] Prior to 1913 Turkey in Europe included the Vilayet of Salonica, which now belongs to Greece.
[2] Including "Central Asia in 1912 and 1913."

TABLE 139.—*Total production of raw silk in countries mentioned in Table 138, 1900–1913.*

Year.	Production.	Year.	Production.	Year.	Production.
	Pounds.		*Pounds.*		*Pounds.*
1900	40,724,000	1905	41,513,000	1910	54,002,000
1901	42,393,000	1906	46,106,000	1911	54,167,000
1902	41,368,000	1907	48,634,000	1912	59,336,000
1903	39,981,000	1908	53,087,000	1913 (preliminary)	59,634,000
1904	45,195,000	1909	54,035,000		

WOOD PULP.

TABLE 140.—*Wood pulp: International trade, calendar years 1911–1913.*

[All kinds of pulp from wood have been taken for this item, but no pulp made from other fibrous substances. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Austria-Hungary	218,781	214,074	225,489	Russia	55,260	48,100	29,369
Belgium	95,276	91,291	74,351	Sweden	1,868,461	2,091,135	2,091,135
Canada	519,028	696,203	596,339	Switzerland	13,408	13,109	14,659
Finland	251,912	304,751	278,907	United States	18,988	28,379	39,552
Germany	378,484	402,769	412,195	Other countries	108,697	[2] 116,908	116,812
Norway	1,369,248	1,529,091	1,558,473	Total	4,897,543	5,535,900	5,437,272

IMPORTS.

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
Argentina	53,447	43,970	70,531	Russia	59,452	59,165	58,793
Austria-Hungary	16,710	17,665	13,377	Spain	89,508	100,609	134,351
Belgium	301,781	322,398	291,900	Sweden	11,568	10,518	10,518
Denmark	104,577	118,266	130,654	Switzerland	17,893	23,967	26,602
France	802,020	927,456	1,025,842	United Kingdom	1,716,158	2,031,266	2,153,077
Germany	137,683	125,683	121,124	United States	1,124,851	1,079,580	1,082,914
Italy	175,642	204,554	212,241	Other countries	66,090	62,449	63,645
Japan	71,021	101,730	101,730				
Portugal	18,656	19,796	19,796	Total	4,767,057	5,249,162	5,517,097

FARM ANIMALS AND THEIR PRODUCTS.

TABLE 141.—*Live stock of countries named.*

[Africa incompletely represented, through lack of statistics for large areas. Number of animals in China Persia, Afghanistan, Chosen, Bolivia, Ecuador, and several less important countries unknown. For Brazil number of cattle alone estimated, but roughly. In general, statistics of cattle, horses, sheep, and swine are much more complete than those of other animals, as statements for the world.]

[000 omitted.]

Country.	Year.	Cattle.	Swine.	Sheep.	Goats.	Horses.	Mules.	Asses.	Buffaloes.	Camels
NORTH AMERICA.										
United States:										
Contiguous—		*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
On farms	1914	56,592	58,933	49,719	[1] 2,915	20,962	4,449	[1] 106		
Not on farms	1910	1,879	1,288	391	115	3,183	270	17		
Noncontiguous—										
Alaska	1910	1	(2)	(2)	(2)	2	(2)	(2)		
Hawaii	1910	149	31	77	5	28	9	3	(2)	
Porto Rico	1910	310	106	6	49	58	5	1	(2)	
Total United States (except Philippine Islands)		58,937				24,233				
Canada:										
Prince Edward Island	1914	108	42	85		36				
Nova Scotia	1914	277	54	212		63				
New Brunswick	1914	202	73	122		66				
Quebec	1914	1,360	635	571		372				
Ontario	1914	2,056	1,553	641		905				
Manitoba	1914	408	186	45		317				
Saskatchewan	1914	679	458	126		609				
Alberta	1914	812	397	211		519				
British Columbia	1914	135	39	46		61				
Total Canada		6,037	3,434	2,068		2,948				

[1] 1910. [2] Less than 500.

TABLE 141.—*Live stock of countries mentioned*—Continued.

Country.	Year.	Cattle.	Swine.	Sheep.	Goats.	Horses.	Mules.	Asses.	Buffaloes.	Camels.
NORTH AMERICA—continued.										
Central America:		*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Costa Rica	1914	336	64	(1)	1	52	2	(1)		
Guatemala	1890	197	30	78		50				
Honduras	1912	420	118	5	6	88	15	4		
Nicaragua	1908	252	12	(1)	1	28	6	1		
Panama	1907	65	28		3	17	2	(1)		
Salvador	1913	350	220		29	[2] 120				
Mexico	1902	5,142	616	3,424	4,206	859	334	228		
Newfoundland	1911	39	27	98	[3] 17	14				
Cuba	1912	2,830				561	41	2		
Other West Indies		2,971	404	59	105	627	46	14		
SOUTH AMERICA.										
Argentina	1913	29,016	2,900	80,401	4,302	8,894	535	319		
Bolivia	1910	734	114	1,449	468	97	45	173		
British Guiana	1913	72	14	16	12	1		6		
Chile	1913	1,900	170	4,900	310	470	42	38		
Colombia		2,800	2,300	746	361	341	257			
Dutch Guiana	1912	7	4	(1)	3	(1)	(1)	1		
Falkland Islands	1912	8	(1)	711		4				
French Guiana	1911	4								
Paraguay	1913	3,500	24	214	32	183	8			
Uruguay	1908	8,193	180	26,286	20	556	18	4		
Venezuela	1899	2,004	1,618	177	1,667	191	89	313		
EUROPE.										
Austria-Hungary:										
Austria	1910	9,160	6,432	2,429	1,254	1,801	21	53		
Hungary (proper)	1911	6,184	6,417	7,698	331	2,001	[4] 19			
Croatia-Slavonia	*1911*	*1,135*	*1,164*	*850*	*96*	*350*	[4] 3			
Bosnia-Herzegovina	1910	1,309	527	2,500	1,393	222	(1)	6	1	
Total Austria-Hungary		17,788	14,540	13,477	3,074	4,374	43			
Belgium	1913	1,849	1,412			267				
Bulgaria	1911	2,018	527	8,632	1,459	478	12	118	477	
Denmark	1914	2,463	2,497	515	41	568				
Finland	1910	1,573	418	1,309	13	361				
France	1913	14,807	7,048	16,213		3,231	193	360		
Germany	*1913*	*20,994*	*25,592*	*5,504*	*3,536*	[8] *4,523*	[5] *2*	[5] *11*		
Greece	1912	400	80	4,000	3,000	160	88	140		
Iceland	1912	26		601	1	46				
Italy	1908	6,199	2,508	11,163	2,715	956	388	850	19	
Luxemburg	1913	102	137	5	10	19	(1)			
Malta	1913	5	4	15	14	3	3	3		
Netherlands	1913	2,097	1,350	842	232	334				
Norway	1907	1,094	319	1,393	296	172				
Portugal	1906	703	1,111	3,073	1,034	88	58	144		
Roumania	1912	2,660	[6] 1,021	[6] 5,269	[6] 207	825	[4] 4			
Russia:										
Russia (proper)	1911	31,023	12,654	40,156	854	21,820	(7) 4	(1)	[7] 3	[7] 204
Poland	1911	2,267	598	945	8	1,220	(1)	(1)		
Northern Caucasia	1911	2,947	887	5,280	306	1,593				
Total European Russia		36,237	14,139	46,381	1,168	24,639				
Servia	1910	958	864	3,809	627	153	(1)	[8] 1	7	
Spain	1912	2,562	2,571	15,830	3,116	526	929	629		4
Sweden	1911	2,690	951	946	66	588				
Switzerland	1911	1,443	570	160	341	144				
Turkey, European	1910	6,726	21	21,190	12,216	1,042	202	1,556	763	494
United Kingdom:										
England and Wales	1914	5,878	2,481	17,260		1,400				
Scotland	1913	1,247	132	6,801		204				
Ireland	1914	5,052	1,060	3,601	242	619	31	245		
Isle of Man and Channel Islands	1913	40	12	77		10				
Total United Kingdom		12,217	3,625	27,739		2,233				

[1] Less than 500.
[2] Includes mules and donkeys.
[3] [illegible]
[4] Includes asses.
[5] 1912.
[6] 1911.
[7] 1910.
[8] Includes mules.

TABLE 141.—*Live stock of countries mentioned*—Continued.

Country.	Year.	Cattle.	Swine.	Sheep.	Goats.	Horses.	Mules.	Asses.	Buffaloes.	Camels
ASIA.										
India:		*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
British	1912	[1] 94,963		22,848	28,555	1,540	106	1,341	[2] 16,751	447
Native States	1912	[1] 11,962		[3] 8,129		159	[4] 171		[2] 1,725	53
Total India		106,925		30,977		1,699	277		18,476	500
Ceylon	1912	1,465	85	91	(5) 209	5			(5) 579	
Cochin China	1911	310	26	(6)	2	11	(6)			
Cyprus	1912	61	40	256	253	69				
Dutch East Indies:										
Java and Madura	1905	2,655				364			2,187	
Other	1905	449				119			447	
Total Dutch East Indies		3,104				483			2,634	
Formosa	1912	155	1,277	(6)	126	(6)			202	
French Indo-China	1911	44		10	24					
Japan	1912	1,399	309	3	101	1,582				
Korea	1912	1,041	625	(6)	10	47	1	12		
Guam		5								
Philippine Islands	1913	388	1,822	103	515	182			1,048	
Russia (28 governments):										
Central Asia	1911	5,629	118	23,719	2,968	5,316				[9] 365
Siberia	1911	5,720	1,126	5,025	225	4,597				[9] 1
Transcaucasia	1911	3,331	290	5,749	679	417		[10] 122	[10] 338	[10] 17
Total Asiatic Russia		14,680	1,534	34,493	3,872	10,330				383
Siam		1,628				58			1,528	
Straits Settlements and Labuan	1913	46	158	60	13	2				
Turkey (Asiatic)		3,000		45,000	9,000	800		2,500		
AFRICA.										
Algeria	1911	1,114	110	8,529	[11] 3,682	227	192	[11] 279		199
Basutoland	1911	437	(6)	1,369	2	88		(6)		
Buchanaland	1911	324		[3] 358		2		3		
British East Africa	1913	780	3	6,500	4,020	1				
Dahomey	1911	119		196	137	1		(6)		
Egypt	1913	637				48	23	682	633	
Eritrea	1905	251		384		1	29			47
French Guinea	1911	382		128	136	3	(6)	1		
Gabon	1911	(6)		10	45	(6)		(6)		
Gambia	1907	83				4				
German East Africa	1905	[8] 1,489	1	1,560	1,820	(6)	(6)	9		(6)
German Southwest Africa	1912	172	7	499	469	13	[4] 12			1
Ivory Coast	1911	92	1	92	142			(6)		
Madagascar	1911	5,330	543	352	97	2	1	(6)		
Mauritius	1912	19	6	1	6	1				
Mayotte and dependencies	1911	34		(6)	27	(6)	(6)	(6)		
Nyasaland Protectorate	1912	63	22	23	137	(6)				
Reunion	1911	5	1	2	4	(6)	1	(6)		
Rhodesia	1911	[11] 855		300	602					
St. Helena	1911	1	(6)	4	1	(6)		1		
Senegal	1911	665		206	428	36	(6)	40		12
Seychelles	1913	1	6	(6)	1	(6)				
Sierra Leone	1910	2	(6)	1		(6)				
Somaliland (Italian)	1910	885		175						
Southern Nigeria (Lagos)	1902	2	2	2	3	(6)		10		
Sudan (Anglo-Egyptian)	1909	245		830	977	3		121		23
Swaziland	1912	74	9	[8] 164	[7] 80	1	(6)	[7] 2		
Tunis	1912	225	19	767	492	37	22	192		110
Uganda Protectorate	1914	1,278		[12] 542	[12] 1,220	(6)	(6)	(6)		

[1] Including buffalo calves.
[2] Buffalo calves included with cattle.
[3] Including goats.
[4] Including asses.
[6] Less than 500.
[7] 1911.
[8] 1910.
[9] 1908.
[10] 1902.
[11] 1912.
[12] Not including 3,000,000 sheep and goats in Rudolf Province.

TABLE 141.—*Live stock of countries mentioned*—Continued.

Country.	Year.	Cattle.	Swine.	Sheep.	Goats.	Horses	Mules.	Asses.	Buffaloes.	Camels.
AFRICA—continued.										
Union of South Africa:										
Cape of Good Hope	1911	2,716	506	17,135	7,953	334	47	191	......	......
Natal	1911	456	110	1,519	989	75	16	28	......	......
Orange Free State	1911	1,286	163	8,588	1,049	221	6	12	......	......
Transvaal	1911	1,339	303	3,415	1,772	89	25	106	......	......
Total Union of South Africa	1911	5,797	1,082	30,657	11,763	719	94	337	......	......
OCEANIA.										
Australia:										
Queensland	1913	5,272	139	[1] 21,679	[3] 8	690	......	......	......	......
New South Wales [2]	1913	2,837	288	39,843	[4] 38	746	......	......	......	[4] 1
Victoria	1913	1,529	221	12,114	......	562	......	......	......	......
South Australia	1913	353	64	5,073	[4] 27	284	......	......	......	......
Western Australia	1913	829	48	4,418	[4] 32	156	......	[4] 2	......	[4] 3
Tasmania	1912	222	49	1,803	2	44	......	......	......	......
Northern Territory	1912	406	2	76	......	18	......	......	......	......
Total Australia	......	11,448	811	85,066	......	2,509	......	......	......	......
New Zealand	1911	2,020	349	[5] 24,799	6	404	(6)	......	......	......
Fiji	1912	46	2	4	[1] 15	6	......	......	......	......
New Caledonia	1911	128	......	6	6	3	(6)	(6)	......	......

[1] 1911.
[2] Including Federal Territory.
[3] 1905.
[4] 1910.
[5] 1914.
[6] Less than 500.

TABLE 142.—*Hides and skins: International trade, calendar years 1911-1913.*

[This table gives the classification as found in the original returns, and the summary statements for "All countries" represent the total for each class only so far as it is disclosed in the original returns. The following kinds are included: Alligator, buffalo, calf, camel, cattle, deer, goat and kid, horse and colt, kangaroo, mule and ass, sheep and lamb, and all other kinds except furs, bird skins, sheepskins with wool on, skins of rabbits and hares, and tanned or partly tanned hides and skins. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country and classification.	1911	1912	1913 (prelim.).
Argentina:	*Pounds.*	*Pounds.*	*Pounds.*
Cattle, dried	72,580	69,469	46,779
Cattle, salted	160,250	173,534	144,963
Deer	2	12	1
Goat	4,309	5,082	4,387
Horse, dried	4,636	2,593	2,297
Horse, salted	618	373	310
Kid	1,048	840	995
Sheep and lamb	73,304	76,456	47,920
Austria-Hungary:			
Calf, dried	3,485	3,406	3,177
Calf, green	18,335	20,591	22,004
Cattle, dried	6,352	8,253	7,795
Cattle, green	24,100	34,593	37,371
Goat	2,138	2,169	2,074
Horse, dried	1,106	1,077	1,230
Horse, green	3,901	3,082	3,810
Kid	1,078	1,249	1,355
Lamb	3,176	3,059	3,135
Austria-Hungary—Continued.	*Pounds.*	*Pounds.*	*Pounds.*
Sheep	2,713	2,809	5,894
Unclassified	1,389	1,151	1,351
Belgium:			
Unclassified	124,659	123,926	116,608
Brazil:			
Cattle, dried	16,558	10,316	20,460
Cattle, green	53,610	63,611	59,306
Deer	239	227	387
Goat	4,785	5,158	5,062
Horse	8	(1)	(1)
Sheep	1,111	1,612	1,894
Unclassified	33	34	82
British India:			
Hides, unclassified	101,400	127,446	134,799
Goat	55,096	57,961	82,438
Skins, unclassified	5,067	4,379	6,971

[1] Less than 500 pounds.

TABLE 142.—*Hides and skins: International trade, calendar years 1911-1913*—Continued.

EXPORTS—Continued.

Country and classification.	1911	1912	1913 (prelim.).
British South Africa:	*Pounds.*	*Pounds.*	*Pounds.*
Cattle	13,298	20,595	21,515
Goat	7,469	8,126	9,105
Sheep	24,077	29,103	32,319
Canada:			
Sheep	129	82	36
Hides and skins, not elsewhere specified [1]	37,000	48,000	60,000
China:			
Buffalo	40,331	43,920	66,405
Horse	223	509	1,518
Goat	24,047	18,362	22,176
Sheep	565	753	1,105
Chosen (Korea):			
Cattle	5,633	4,448	4,649
Cuba:			
Cattle	14,248	14,382	14,207
Unclassified	17	3	322
Denmark:			
Unclassified	21,279	24,403	20,814
Dutch East Indies:			
Unclassified	17,257	17,088	[2] 17,088
Egypt:			
Cattle and camel	6,889	7,003	7,029
Sheep and goat	2,648	2,598	2,946
France:			
Calf	35,654	32,153	34,164
Goat	6,236	4,215	5,411
Kid	2,407	2,863	2,601
Lamb	1,370	1,722	1,983
Sheep	14,269	15,992	13,030
Unclassified	73,504	79,097	82,304
Germany:			
Calf	27,600	27,207	19,158
Cattle	97,730	111,671	104,653
Goat	2,377	2,884	2,912
Horse	17,675	14,959	14,594
Sheep	5,311	725	947
Unclassified	730	953	1,296
Italy:			
Cattle	29,063	35,203	48,094
Calf	4,575	5,405	7,446
Goat	849	954	1,191
Kid	877	939	989
Lamb	2,235	2,336	2,207
Sheep	912	1,017	782
Unclassified	1,067	897	1,316
Mexico:			
Alligator	213	132	[2] 132
Cattle	32,124	32,635	[2] 32,635
Deer	770	646	[2] 646
Goat	6,238	5,624	[2] 5,624
Sheep	15	2	[2] 2
Netherlands:			
Hides, dried	22,471	21,645	24,161
Hides, fresh	177	494	162
Hides, salted	43,272	42,510	42,399
Sheep	1,368	1,647	993
New Zealand:			
Hides, unclassified [3]	4,544	5,138	5,927
Sheep	17,453	20,402	20,671
Skins, unclassified	921	1,001	1,077
Peru:			
Cattle	4,461	5,879	6,930
Goat	855	822	872
Sheep	81	99	172
Russia:			
Hides, large	19,975	55,591	90,065
Hides, small	44,227	55,093	
Sheep and goat	21,447	26,759	23,257
Singapore:			
Hides, unclassified	8,111	7,163	[2] 7,163
Spain:			
Goat	1,865	1,801	1,923
Sheep	7,746	8,574	9,206
Unclassified	6,940	8,202	6,471
Sweden:			
Cattle, wet	28,065	23,149	[2] 23,149
Cattle, dry	523	395	[2] 395
Horse, wet	711	620	[2] 620
Horse, dry	(4)	2	[2] 2
Goat, kid, lamb, and sheep, wet	321	798	[2] 798
Goat, lamb, and sheep, dry	69	110	[2] 110
Unclassified, dry	5	6	[2] 6
Unclassified, wet	19	130	[2] 130
Switzerland:			
Hides, unclassified	14,884	15,897	15,673
Skins, unclassified	7,230	7,174	8,178
United Kingdom:			
Hides, unclassified	24,182	30,447	24,388
Sheepskins	16,215	18,463	17,837
United States:			
Calf	212	780	583
Cattle	6,519	20,514	14,454
Unclassified	29,385	7,085	7,119
Uruguay:			
Calf	[2] 429	[5] 429	[5] 429
Cattle, dried	[2] 18,560	[5] 18,560	[5] 18,560
Cattle, salted	[2] 29,485	[5] 29,485	[5] 29,485
Horse, dried	[2] 526	[5] 526	[5] 526
Horse, salted	[2] 54	[5] 54	[5] 54
Lamb	[2] 503	[5] 503	[5] 503
Sheep	17,748	22,825	17,597
Yearling, dried	[2] 3,112	[5] 3,112	[5] 3,112
Yearling, salted	[2] 100	[5] 100	[5] 100
Venezuela:			
Cattle	7,765	7,426	7,013
Deer	364	483	354
Goat	2,290	3,439	1,606
Sheep	3	....	....
Other countries:			
Hides—			
Cattle and buffalo	89,155	102,516	110,795
Horse	594	645	427
Skins—			
Alligator	66	65	64
Calf	4,509	4,891	4,184
Deer	1,297	1,491	1,466
Goat and kid	20,115	18,534	21,466
Sheep and lamb	22,856	15,613	16,062
Sheep and goat, mixed	11,046	11,750	11,754
Unclassified	32,977	54,514	55,941
Total	1,920,720	2,116,701	2,033,693
All countries:			
Hides—			
Cattle and buffalo	757,305	843,547	814,202
Horse	30,052	26,154	25,388
Skins—			
Alligator	279	197	196
Calf	94,799	94,861	91,145
Deer	2,672	2,859	2,854
Goat and kid	143,977	141,613	142,137
Sheep and lamb	213,160	224,687	193,984
Sheep and goat, mixed	35,551	42,606	38,865
Unclassified	642,924	743,669	724,932
Total	1,920,719	2,116,701	2,033,693

[1] Unofficial estimate.
[2] Year preceding.
[3] Number of pounds computed from stated number of hides and skins.
[4] Less than 500 pounds.
[5] Data for 1910.

TABLE 142.—*Hides and skins: International trade, calendar years 1911–1913*—Continued.

IMPORTS.

Country and classification.	1911	1912	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*
Austria-Hungary:			
Calf, dried	1,500	910	1,071
Calf, green	1,678	1,256	1,581
Cattle, dried	43,970	37,877	42,309
Cattle, green	42,488	35,006	37,440
Goat	1,366	1,214	1,500
Horse, dried	86	73	245
Horse, green	143	169	243
Kid	426	482	586
Lamb	10,193	10,299	10,124
Sheep	3,813	3,027	3,770
Unclassified	600	715	608
Belgium:			
Hides, green	186,470	186,116	197,072
British India:			
Cattle	20,861	21,174	14,401
Hides, unclassified	846	657	401
Skins, unclassified	4,435	5,453	5,336
Canada:			
Unclassified	41,826	64,300	44,667
Denmark:			
Unclassified	10,388	11,794	10,766
Finland:			
Hides, dried	3,186	4,919	6,200
Hides, green	3,937	5,330	6,374
Sheep	334	515	310
France:			
Calf	5,506	4,743	5,114
Goat	21,799	19,928	19,131
Kid	4,409	4,406	4,122
Lamb	230	360	834
Sheep	5,968	4,365	3,123
Unclassified	115,809	119,530	131,201
Germany:			
Buffalo	4,690	(1)	(1)
Calf, dried	12,499	13,232	10,641
Calf, green	64,582	63,464	75,846
Cattle, dried	81,324	88,521	120,063
Cattle, green	217,518	216,646	249,518
Goat, with hair on	18,527	21,767	24,426
Horse, dried	6,204	3,884	4,333
Horse, green	23,481	22,896	25,096
Lamb	123	2,689	2,582
Sheep	2,023		
Unclassified	2,014	2,069	2,239
Greece:			
Hides, unclassified	6,350	5,257	5,219
Italy:			
Calf	1,641	1,306	1,211
Cattle	54,067	46,517	47,611
Sheep	2,653	3,115	4,270
Goat	67	41	104
Kid	52	75	61
Lamb	722	675	537
Unclassified	121	83	184
Japan:			
Cattle	2,634	5,673	[2] 5,673
Deer	687	442	[2] 442
Netherlands:			
Hides, dried	34,208	35,791	41,384
Hides, fresh	6	13	25
Hides, salted	35,601	36,517	34,189
Sheep	3,753	4,492	4,612
Norway:			
Hides, dry	3,596	3,475	3,507
Hides, green	10,340	11,267	9,357
Hides, salted	62	447	[2] 447
Skins, unclassified	30	131	[2] 131
Portugal:			
Hides, dried	7,642	7,398	[2] 7,398
Hides, green	356	178	[2] 178
Roumania:			
Buffalo and cattle	8,629	[3] 8,629	[3] 8,629
Calf	191	[3] 191	[3] 191
Sheep, lamb, and goat	810	[3] 810	[3] 810
Russia:			
Hides, dry	12,956	10,326	9,317
Hides, green	82,064	72,973	102,452
Goat and kid	3,934	3,239	1,603
Sheep	8,396	8,829	1,733
Singapore:			
Hides, unclassified	7,835	10,965	[2] 10,965
Spain:			
Unclassified	20,075	21,556	10,035
Sweden:			
Cattle, wet	18,511	18,733	[2] 18,733
Cattle, dry	5,334	6,513	[2] 6,513
Horse, wet	62	109	[2] 109
Goat, kid, lamb, and sheep, wet	236	346	[2] 346
Goat, lamb, and sheep, dry	310	649	[2] 649
Unclassified, wet	(4)	15	[2] 15
Unclassified, dry	23	33	[2] 33
United Kingdom:			
Calf, dry	....	215	24
Calf, wet	....	2,893	666
Goat [5]	8,275	7,308	7,203
Hides, dry and wet	83,757	107,506	105,165
Sheep [5]	656	4,750	1,717
Skins, unclassified [5]	3,006	....	....
United States:			
Calf, dry	37,287	49,314	26,302
Calf, green or pickled	45,344	65,546	50,152
Cattle and buffalo, dry	62,563	107,234	77,625
Cattle, and buffalo, green or pickled	111,704	207,695	188,655
Goat, dry	64,295	70,291	64,509
Goat, green or pickled	26,769	25,032	25,168
Horse, dry	5,885	8,742	9,726
Horse, green or pickled	6,170	5,959	7,425
Kangaroo	....	458	1,309
Sheep, dry	21,190	30,749	27,552
Sheep, green or pickled	36,245	37,482	40,654
Unclassified	7,335	6,603	8,803
Other countries:			
Hides—			
Cattle and buffalo	16,132	14,226	14,121
Horse	35	44	54
Skins—			
Deer	(4)	4	[2] 4
Goat and kid	532	549	541
Sheep and lamb	1,297	1,294	882
Sheep and goat, mixed	28	42	[2] 42
Unclassified	33,298	34,270	33,246
Total	1,871,469	2,114,813	2,069,190
All countries:			
Hides—			
Cattle and buffalo	690,455	834,444	801,291
Horse	42,066	41,876	47,231
Skins—			
Calf	170,378	203,076	172,799
Deer	687	446	[2] 446
Goat and kid	150,751	154,332	148,954
Kangaroo	....	458	1,309
Sheep and lamb	97,556	112,641	102,400
Sheep and goat, mixed	1,384	1,847	[2] 1,847
Unclassified	718,192	766,893	792,913
Total	1,871,469	2,114,813	2,069,190

[1] Included in cattle, green.
[2] Year preceding.
[3] Data for 1911.
[4] Less than 500 pounds.
[5] Number of pounds computed from stated number of skins.

HORSES AND MULES.

TABLE 143.—*Horses and mules: Number and value on farms in the United States, 1867–1915.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of numbers are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available. It should also be observed that the census of 1910, giving numbers as of Apr. 15, is not strictly comparable with former censuses, which related to numbers June 1.

Jan. 1—	Horses.			Mules.		
	Number.	Price per head Jan. 1.	Farm value Jan. 1.	Number.	Price per head Jan. 1.	Farm value Jan. 1
1867	5,401,000	$59.05	$318,924,000	822,000	$66.94	$55,048,000
1868	5,757,000	54.27	312,416,000	856,000	56.04	47,954,000
1869	6,333,000	62.57	396,222,000	922,000	79.23	73,027,000
1870	8,249,000	67.43	556,251,000	1,180,000	90.42	106,654,000
1870, census, June 1	*7,145,370*			*1,125,415*		
1871	8,702,000	71.14	619,039,000	1,242,000	91.98	114,272,000
1872	8,991,000	67.41	606,111,000	1,276,000	87.14	111,222,000
1873	9,222,000	66.39	612,273,000	1,310,000	85.15	111,546,000
1874	9,334,000	65.15	608,073,000	1,339,000	81.35	108,953,000
1875	9,504,000	61.10	580,708,000	1,394,000	71.89	100,197,000
1876	9,735,000	57.29	557,747,000	1,414,000	66.46	94,001,000
1877	10,155,000	55.83	567,017,000	1,444,000	64.07	92,482,000
1878	10,330,000	56.63	584,999,000	1,638,000	62.03	101,579,000
1879	10,939,000	52.36	572,712,000	1,713,000	56.00	95,942,000
1880	11,202,000	54.75	613,297,000	1,730,000	61.26	105,948,000
1880, census, June 1	*10,357,488*			*1,812,808*		
1881	11,430,000	58.44	667,954,000	1,721,000	69.79	120,096,000
1882	10,522,000	58.53	615,825,000	1,835,000	71.35	130,945,000
1883	10,838,000	70.59	765,041,000	1,871,000	79.49	148,732,000
1884	11,170,000	74.64	833,734,000	1,914,000	84.22	161,215,000
1885	11,565,000	73.70	852,283,000	1,973,000	82.38	162,497,000
1886	12,078,000	71.27	860,823,000	2,053,000	79.60	163,381,000
1887	12,497,000	72.15	901,686,000	2,117,000	78.91	167,058,000
1888	13,173,000	71.82	946,096,000	2,192,000	79.78	174,854,000
1889	13,663,000	71.89	982,195,000	2,258,000	79.49	179,444,000
1890	14,214,000	68.84	978,517,000	2,331,000	78.25	182,394,000
1890, census, June 1	*14,969,469*			*2,295,532*		
1891	14,057,000	67.00	941,823,000	2,297,000	77.88	178,847,000
1892	15,498,000	65.01	1,007,594,000	2,315,000	75.55	174,882,000
1893	16,207,000	61.22	992,225,000	2,331,000	70.68	164,764,000
1894	16,081,000	47.83	769,225,000	2,352,000	62.17	146,233,000
1895	15,893,000	36.29	576,731,000	2,333,000	47.55	110,928,000
1896	15,124,000	33.07	500,140,000	2,279,000	45.29	103,204,000
1897	14,365,000	31.51	452,649,000	2,216,000	41.66	92,302,000
1898	13,961,000	34.26	478,362,000	2,190,000	43.88	96,110,000
1899	13,665,000	37.40	511,075,000	2,134,000	44.96	95,963,000
1900	13,538,000	44.61	603,969,000	2,086,000	53.55	111,717,000
1900, census, June 1	*18,267,020*			*3,264,616*		
1901 [1]	16,745,000	52.86	885,200,000	2,864,000	63.97	183,232,000
1902	16,531,000	58.61	968,935,000	2,757,000	67.61	186,412,000
1903	16,557,000	62.25	1,030,706,000	2,728,000	72.49	197,753,000
1904	16,736,000	67.93	1,136,940,000	2,758,000	78.88	217,533,000
1905	17,058,000	70.37	1,200,310,000	2,889,000	87.18	251,840,000
1906	18,719,000	80.72	1,510,890,000	3,404,000	98.31	334,681,000
1907	19,747,000	93.51	1,846,578,000	3,817,000	112.16	428,064,000
1908	19,992,000	93.41	1,867,530,000	3,869,000	107.76	416,939,000
1909	20,640,000	95.64	1,974,052,000	4,053,000	107.84	437,082,000
1910	*21,040,000*			*4,123,000*		
1910, census, Apr. 15	*19,833,113*	108.03	2,142,524,000	*4,209,769*	120.20	506,049,000
1911 [1]	20,277,000	111.46	2,259,981,000	4,323,000	125.92	544,359,000
1912	20,509,000	105.94	2,172,694,000	4,362,000	120.51	525,657,000
1913	20,567,000	110.77	2,278,222,000	4,386,000	124.31	545,245,000
1914	20,962,000	109.32	2,291,638,000	4,449,000	123.85	551,017,000
1915	21,195,000	103.33	2,190,102,000	4,479,000	112.36	503,271,000

HORSES AND MULES—Continued.

TABLE 144.—*Horses and mules: Number and value on farms Jan. 1, 1914 and 1915, by States.*

State.	Horses.						Mules.					
	Number (thousands) Jan. 1—		Average price per head Jan. 1—		Farm value (thousands of dollars) Jan. 1—		Number (thousands) Jan. 1—		Average price per head Jan. 1		Farm value (thousands of dollars) Jan. 1—	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Maine	113	111	$146	$150	16,498	16,650						
New Hampshire	47	47	127	137	5,969	6,439						
Vermont	88	88	131	129	11,528	11,352						
Massachusetts	64	65	155	161	9,920	10,465						
Rhode Island	10	10	146	156	1,460	1,560						
Connecticut	47	47	148	153	6,956	7,191						
New York	615	615	142	145	87,330	89,175	4	4	$152	$154	608	616
New Jersey	92	91	146	157	13,432	14,287	4	4	169	177	676	708
Pennsylvania	596	584	134	139	79,864	81,176	46	45	142	148	6,532	6,660
Delaware	36	35	100	106	3,600	3,710	6	6	121	126	726	756
Maryland	167	165	113	119	18,871	19,635	25	24	138	143	3,450	3,432
Virginia	354	350	109	114	38,586	39,900	62	61	128	136	7,936	8,296
West Virginia	192	190	114	122	21,888	23,180	12	12	119	131	1,428	1,572
North Carolina	182	180	130	139	23,660	25,020	194	192	151	160	29,294	30,720
South Carolina	83	85	131	144	10,873	12,240	166	171	149	167	24,734	28,557
Georgia	125	128	119	131	14,875	16,768	309	319	140	161	43,260	51,359
Florida	57	55	121	122	6,897	6,710	28	27	163	168	4,564	4,536
Ohio	910	901	128	132	116,480	118,932	24	24	127	132	3,048	3,169
Indiana	854	854	114	116	97,356	99,064	86	86	117	121	10,062	10,406
Illinois	1,467	1,497	105	113	154,035	169,161	145	148	110	121	15,950	17,908
Michigan	673	653	132	139	88,836	90,767	4	4	131	133	524	532
Wisconsin	705	678	131	136	92,355	92,208	3	3	127	135	381	405
Minnesota	872	847	116	125	101,152	105,875	6	6	124	134	744	804
Iowa	1,600	1,584	105	118	168,000	186,912	58	57	111	123	6,438	7,011
Missouri	1,095	1,095	88	98	96,360	107,310	329	326	98	112	32,242	36,512
North Dakota	785	748	110	112	86,350	83,776	8	8	122	130	976	1,040
South Dakota	759	730	89	96	67,551	70,080	14	14	106	110	1,484	1,540
Nebraska	1,038	1,048	92	94	95,496	98,512	85	84	105	105	8,925	8,820
Kansas	1,132	1,110	93	93	105,276	103,230	233	222	102	105	23,766	23,310
Kentucky	443	443	95	103	42,085	45,629	231	229	106	118	24,486	27,022
Tennessee	353	346	100	116	35,300	40,136	275	270	110	127	30,250	34,290
Alabama	149	149	96	113	14,304	16,837	281	278	114	135	32,034	37,530
Mississippi	241	241	86	95	20,726	22,895	292	286	108	115	31,536	32,890
Louisiana	191	191	83	85	15,853	16,235	132	132	125	128	16,500	16,896
Texas	1,192	1,216	78	80	92,976	97,280	763	753	100	109	75,300	82,077
Oklahoma	758	766	81	85	61,398	65,110	269	269	96	104	25,824	27,976
Arkansas	276	273	76	93	20,976	25,389	240	235	96	114	23,040	26,790
Montana	391	372	86	102	33,626	37,944	4	4	98	106	392	424
Wyoming	176	171	79	79	13,904	13,509	2	2	101	113	202	226
Colorado	347	340	85	83	29,495	28,220	18	17	100	101	1,800	1,717
New Mexico	217	197	55	55	11,935	10,835	16	15	81	92	1,296	1,380
Arizona	118	112	70	73	8,260	8,176	7	6	104	144	728	864
Utah	146	140	86	91	12,556	12,740	2	2	79	82	158	164
Nevada	78	76	69	78	5,382	5,928	3	3	79	79	237	237
Idaho	243	234	92	96	22,356	22,464	4	4	85	103	340	412
Washington	311	305	96	106	29,856	32,330	15	14	104	116	1,560	1,624
Oregon	304	301	90	96	27,360	28,896	10	10	96	107	960	1,070
California	503	498	100	100	50,300	49,800	74	73	120	120	8,880	8,760
United States	21,195	20,962	103.33	109.32	2,190,102	2,291,638	4,479	4,449	112.36	123.85	503,271	551,017

HORSES AND MULES—Continued.

TABLE 145.—*Horses and mules: Imports, exports, and prices, 1892–1914.*

Year ending June 30—	Imports of horses.			Exports of horses.			Exports of mules.		
	Number.	Value.	Average import price.	Number.	Value.	Average export price.	Number.	Value.	Average export price.
1892	14,074	$2,455,868	$174.50	3,226	$611,188	$189.46	1,965	$238,591	$121.42
1893	15,451	2,388,267	154.57	2,967	718,607	242.20	1,634	210,278	128.69
1894	6,166	1,319,572	214.01	5,246	1,108,995	211.40	2,063	240,961	116.80
1895	13,098	1,055,191	80.56	13,984	2,209,298	157.90	2,515	186,452	74.14
1896	9,991	662,591	66.32	25,126	3,530,703	140.52	5,918	406,161	68.63
1897	6,998	464,808	66.42	39,532	4,769,265	120.64	7,473	545,331	72.97
1898	3,085	414,899	134.49	51,150	6,176,569	120.75	8,098	664,789	82.09
1899	3,042	551,050	181.15	45,778	5,444,342	118.93	6,755	516,908	76.52
1900	3,102	596,592	192.32	64,722	7,612,616	117.62	43,369	3,919,478	90.38
1901	3,785	985,738	260.43	82,250	8,873,845	107.89	34,405	3,210,267	93.31
1902	4,832	1,577,234	326.41	103,020	10,048,046	97.53	27,586	2,692,298	97.60
1903	4,999	1,536,296	307.32	34,007	3,152,159	92.69	4,294	521,725	121.47
1904	4,726	1,460,287	308.99	42,001	3,189,100	75.93	3,658	412,971	112.90
1905	5,180	1,591,083	307.16	34,822	3,175,259	91.19	5,826	645,464	110.79
1906	6,021	1,716,675	285.11	40,087	4,365,981	108.91	7,167	989,639	138.08
1907	6,080	1,978,105	325.35	33,882	4,359,957	131.99	6,781	850,901	125.48
1908	5,487	1,604,392	292.40	19,000	2,612.587	137.50	6,609	990,667	149.90
1909	7,084	2,007,276	283.35	21,616	3,386,617	156.67	3,432	472,017	137.53
1910	11,620	3,296,022	283.65	28,910	4,081,157	141.17	4,512	614,094	136.18
1911	9,593	2,692,074	280.63	25,145	3,845,253	152.92	6,585	1,070,051	162.50
1912	6,607	1,923,025	291.06	34,828	4,764,815	136.81	4,901	732,095	149.30
1913	10,008	2,125,875	212.42	28,707	3,960,102	137.95	4,744	733,795	154.68
1914	*33,019*	*2,605,029*	*78.89*	*22,776*	*3,388,819*	*148.79*	*4,883*	*690,974*	*141.51*

CATTLE.

TABLE 146.—*Cattle (live): Imports, exports, and prices, 1892–1914.*

Year ending June 30—	Imports.			Exports.		
	Number.	Value.	Average import price.	Number.	Value.	Average export price.
1892	2,168	$47,466	$21.89	394,607	$35,099,095	$88.95
1893	3,293	45,682	13.87	287,094	26,032,428	90.68
1894	1,592	18,704	11.75	359,278	33,461,922	93.14
1895	149,781	765,853	5.11	331,722	30,603,796	92.26
1896	217,826	1,509,856	6.93	372,461	34,560,672	92.79
1897	328,977	2,589,857	7.87	392,190	36,357,451	92.70
1898	291,589	2,913,223	9.99	439,255	37,827,500	86.12
1899	199,752	2,320,362	11.62	389,490	30,516,833	78.35
1900	181,006	2,257,694	12.47	397,286	30,635,153	77.11
1901	146,022	1,931,433	13.23	459,218	37,566,980	81.81
1902	96,027	1,608,722	16.75	392,884	29,902,212	76.11
1903	66,175	1,161,548	17.55	402,178	29,848,936	74.22
1904	16,056	310,737	19.35	593,409	42,256,291	71.21
1905	27,855	458,572	16.46	567,806	40,598,048	71.50
1906	29,019	548,430	18.90	584,239	42,081,170	72.03
1907	32,402	565,122	17.44	423,051	34,577,392	81.73
1908	92,356	1,507,810	16.32	349,210	29,339,134	84.02
1909	139,184	1,999,422	14.37	207,542	18,046,976	86.96
1910	195,938	2,999,824	15.37	139,430	12,200,154	87.50
1911	182,923	2,953,077	16.14	150,100	13,163,920	87.70
1912	318,372	4,805,574	15.09	105,506	8,870,075	84.07
1913	421,649	6,640,668	15.75	24,714	1,177,199	47.63
1914	868,368	18,696,718	21.53	18,376	647,288	35.22

CATTLE—Continued.

TABLE 147.—*Cattle: Number and value on farms in the United States, 1867–1915.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of numbers are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available. It should also be observed that the census of 1910, giving numbers as of Apr. 15, is not strictly comparable with former censuses, which related to numbers June 1.

January 1—	Milch cows.			Other cattle.		
	Number.	Price per head Jan. 1.	Farm value Jan. 1.	Number.	Price per head Jan. 1.	Farm value Jan. 1.
1867	8,349,000	$28.74	$239,947,000	11,731,000	$15.79	$185,254,000
1868	8,692,000	26.56	230,817,000	11,942,000	15.06	179,888,000
1869	9,248,000	29.15	269,610,000	12,185,000	18.73	228,183,000
1870	10,096,000	32.70	330,175,000	15,388,000	18.87	290,401,000
1870, census, June 1	*8,935,332*			*13,566,005*		
1871	*10,023,000*	33.89	*339,701,000*	*16,212,000*	20.78	336,860,000
1872	10,304,000	29.45	303,438,000	16,390,000	18.12	296,932,000
1873	*10,576,000*	26.72	*282,559,000*	*16,414,000*	*18.06*	*296,448,000*
1874	10,705,000	25.63	274,326,000	16,218,000	17.55	284,706,000
1875	10,907,000	25.74	280,701,000	16,313,000	*16.91*	*275,872,000*
1876	11,085,000	25.61	283,879,000	16,785,000	17.00	285,387,000
1877	11,261,000	25.47	286,778,000	17,956,000	15.99	287,155,000
1878	11,300,000	25.74	290,898,000	19,223,000	16.72	321,346,000
1879	11,826,000	21.71	256,721,000	21,408,000	15.38	320,364,000
1880	12,027,000	23.27	279,899,000	21,231,000	16.10	341,761,000
1880, census, June 1	*12,443,120*			*22,488,550*		
1881	12,369,000	23.95	296,277,000	20,939,000	17.33	362,862,000
1882	12,612,000	25.89	326,489,000	23,280,000	19.89	463,070,000
1883	*13,126,000*	*30.21*	*396,575,000*	*28,046,000*	*21.81*	*611,549,000*
1884	13,501,000	31.37	423,487,000	29,046,000	23.52	683,229,000
1885	13,905,000	29.70	412,903,000	29,867,000	23.25	694,383,000
1886	*14,235,000*	*27.40*	*389,986,000*	*31,275,000*	*21.17*	*661,956,000*
1887	14,522,000	26.08	378,790,000	33,512,000	19.79	663,138,000
1888	*14,856,000*	*24.65*	*366,252,000*	*34,378,000*	*17.79*	*611,751,000*
1889	15,299,000	23.94	366,226,000	35,032,000	17.05	597,237,000
1890	15,953,000	22.14	353,152,000	36,849,000	15.21	560,625,000
1890, census, June 1	*16,511,950*			*33,734,128*		
1891	16,020,000	21.62	346,398,000	36,876,000	14.76	544,128,000
1892	16,416,000	21.40	351,378,000	37,651,000	15.16	570,749,000
1893	16,424,000	21.75	357,300,000	35,954,000	15.24	547,882,000
1894	16,487,000	21.77	358,999,000	36,608,000	14.66	536,790,000
1895	16,505,000	21.97	362,602,000	34,364,000	14.06	482,999,000
1896	16,138,000	22.55	363,956,000	32,085,000	15.86	508,928,000
1897	15,942,000	23.16	369,240,000	30,508,000	16.65	507,929,000
1898	15,841,000	27.45	434,814,000	29,264,000	20.92	612,297,000
1899	15,990,000	29.66	474,234,000	27,994,000	22.79	637,931,000
1900	16,292,000	31.60	514,812,000	27,610,000	24.97	689,486,000
1900, census, June 1	*17,135,633*			*50,083,777*		
1901[1]	16,834,000	30.00	505,093,000	45,500,000	19.93	906,644,000
1902	16,697,000	29.23	488,130,000	44,728,000	18.76	839,126,000
1903	17,105,000	30.21	516,712,000	44,659,000	18.45	824,055,000
1904	17,420,000	29.21	508,841,000	43,629,000	16.32	712,178,000
1905	17,572,000	27.44	482,272,000	43,669,000	15.15	661,571,000
1906	19,794,000	29.44	582,789,000	47,068,000	15.85	746,172,000
1907	20,968,000	31.00	645,497,000	51,566,000	17.10	851,557,000
1908	21,194,000	30.67	650,057,000	50,073,000	16.89	845,938,000
1909	21,720,000	32.36	702,945,000	49,379,000	17.49	863,754,000
1910	21,801,000			47,279,000		
1910, census, Apr. 15	*20,625,432*	35.29	727,802,000	*41,178,434*	19.07	785,261,000
1911[1]	20,823,000	39.97	832,209,000	39,679,000	20.54	815,184,000
1912	20,699,000	39.39	815,414,000	37,260,000	21.20	790,064,000
1913	20,497,000	45.02	922,783,000	36,030,000	26.36	949,645,000
1914	20,737,000	53.94	1,118,487,000	35,855,000	31.13	1,116,333,000
1915	21,262,000	55.33	1,176,338,000	37,067,000	33.38	1,237,376,000

[1] Estimates of numbers revised, based on census data.

CATTLE—Continued.

TABLE 148.—*Cattle: Number and value on farms Jan. 1, 1914 and 1915, by States.*

State.	Milch cows.						Other cattle.					
	Number (thousands) Jan. 1—		Average price per head Jan. 1—		Farm value (thousands of dollars) Jan. 1—		Number (thousands) Jan. 1—		Average price per head Jan. 1—		Farm value (thousands of dollars) Jan. 1—	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Me.	157	159	$54.00	$47.50	8,478	7,552	101	100	$26.10	$23.40	2,636	2,340
N. H.	95	96	60.00	53.50	5,700	5,136	64	65	28.00	26.80	1,792	1,742
Vt.	268	265	52.00	47.50	13,936	12,588	167	165	23.10	21.10	3,858	3,482
Mass.	157	162	66.00	59.00	10,362	9,558	83	82	25.10	23.10	2,083	1,894
R. I.	23	23	71.00	70.00	1,633	1,610	11	11	26.80	28.10	295	309
Conn.	118	120	66.70	58.00	7,871	6,960	71	72	29.80	27.90	2,116	2,009
N. Y.	1,509	1,465	61.00	57.00	92,049	83,505	894	876	28.20	27.20	25,211	23,827
N. J.	146	146	68.00	67.00	9,928	9,782	70	68	31.50	30.50	2,205	2,074
Pa.	943	943	59.50	58.40	56,108	55,071	638	632	29.30	28.30	18,693	17,886
Del.	41	39	56.50	52.00	2,316	2,028	20	19	31.20	29.20	624	555
Md.	177	170	54.00	53.80	9,558	9,146	121	119	29.50	29.40	3,570	3,499
Va.	349	342	43.50	42.00	15,182	14,364	450	450	28.60	27.60	12,870	12,420
W. Va.	234	232	51.00	50.00	11,934	11,600	338	331	36.30	35.90	12,269	11,883
N. C.	315	309	36.50	35.10	11,498	10,846	369	365	17.00	17.30	6,273	6,314
S. C.	185	185	33.00	34.20	6,105	6,327	211	211	14.60	14.90	3,081	3,144
Ga.	406	402	32.00	31.30	12,992	12,583	600	660	12.80	12.70	8,448	8,382
Fla.	133	128	42.50	38.00	5,652	4,864	735	735	14.50	13.70	10,658	10,070
Ohio.	895	886	60.00	60.00	53,700	53,160	838	838	34.60	35.40	28,995	29,665
Ind.	646	640	55.00	53.90	35,530	34,496	693	707	35.20	33.90	24,394	23,967
Ill.	1,007	1,017	59.50	58.20	59,916	59,189	1,180	1,216	37.80	35.90	44,604	43,654
Mich.	814	798	60.50	59.70	49,247	47,641	707	680	29.80	28.10	21,069	19,108
Wis.	1,626	1,549	59.50	59.90	96,747	92,785	1,216	1,158	27.70	27.10	33,683	31,382
Minn.	1,186	1,163	53.50	55.00	63,451	63,965	1,208	1,173	24.70	24.30	29,838	28,504
Iowa.	1,377	1,350	57.00	60.50	78,489	81,675	2,683	2,555	37.50	39.20	100,612	100,156
Mo.	797	789	54.50	54.00	43,436	42,606	1,414	1,386	37.90	36.10	53,591	50,035
N. Dak.	339	305	61.50	59.00	20,848	17,995	515	468	36.00	34.60	18,540	16,193
S. Dak.	453	419	59.50	61.00	26,954	25,559	967	912	39.50	39.50	38,196	36,024
Nebr.	625	613	62.50	60.70	39,062	37,209	2,034	1,883	40.80	38.10	82,987	71,742
Kans.	726	698	63.50	57.50	46,101	40,135	1,768	1,565	42.50	36.90	75,140	57,748
Ky.	390	382	45.50	44.50	17,745	16,999	543	527	30.40	28.80	16,507	15,178
Tenn.	355	348	41.00	41.40	14,555	14,407	503	498	22.40	21.40	11,267	10,657
Ala.	384	388	31.50	32.40	12,096	12,571	504	514	12.60	12.00	6,350	6,168
Miss.	434	421	35.00	34.00	15,190	14,314	514	490	14.30	13.50	7,350	6,615
La.	268	263	36.00	34.00	9,648	8,942	448	448	16.40	15.30	7,347	6,854
Tex.	1,086	1,065	47.50	45.60	51,585	48,564	5,121	5,173	31.70	26.50	162,336	137,084
Okla.	494	484	52.00	50.30	25,688	24,345	1,119	1,097	35.40	33.40	39,613	36,640
Ark.	387	376	37.00	37.50	14,319	14,100	484	475	17.20	15.80	8,325	7,505
Mont.	114	104	75.00	70.50	8,550	7,332	791	753	49.00	46.40	38,759	34,939
Wyo.	46	41	78.00	74.50	3,588	3,054	628	546	53.30	49.40	33,472	26,972
Colo.	205	186	68.00	63.00	13,940	11,718	996	949	43.70	40.00	43,525	37,960
N. Mex.	68	62	61.50	55.00	4,182	3,410	991	918	35.50	32.70	35,180	30,019
Ariz.	44	37	74.00	64.00	3,256	2,368	791	739	34.50	32.50	27,290	24,018
Utah.	92	88	62.00	59.00	5,704	5,192	381	356	35.80	35.50	13,640	12,638
Nev.	24	22	77.50	65.10	1,860	1,432	450	437	40.70	38.90	18,315	16,999
Idaho.	120	112	72.00	69.80	8,640	7,818	379	354	41.80	41.20	15,842	14,585
Wash.	253	234	74.00	74.00	18,722	17,316	215	199	34.90	35.70	7,504	7,104
Oreg.	210	196	63.50	65.00	13,335	12,740	503	470	36.30	38.00	18,259	17,860
Cal.	541	515	72.00	62.00	38,952	31,930	1,480	1,410	39.30	33.00	58,164	46,530
U. S.	21,262	20,737	55.33	53.94	1,176,338	1,118,487	37,067	35,855	33.38	31.13	1,237,376	1,116,333

CATTLE—Continued.

TABLE 149.—*Cattle: Wholesale price per 100 pounds, 1900–1914.*

Date.	Chicago.		Cincinnati.		St. Louis.		Kansas City.		Omaha.	
	Inferior to prime.		Fair to medium.		Good to choice native steers.		Common to prime.		Native beeves.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1900	$1.75	$6.60	$3.00	$4.70	$4.00	$6.50	$3.90	$6.50	$3.50	$7.50
1901	2.10	7.00	2.90	5.05	4.75	8.25	4.00	7.00	3.50	7.25
1902	1.90	14.50	3.00	5.40	5.15	8.75	4.10	8.75	3.00	8.15
1903	1.50	8.35	2.25	4.40	5.00	6.00	3.75	6.00	2.05	5.75
1904	1.70	7.65	2.25	4.25	4.90	6.00	4.25	7.00	2.75	6.35
1905	1.85	7.00	2.35	4.75	5.15	7.10	4.00	7.05	3.05	6.50
1906	1.75	7.90	2.35	4.50	5.45	7.00	4.10	7.50	2.90	6.85
1907	2.00	8.00	4.10	6.00	5.35	7.35	3.90	8.25	3.10	7.30
1908	2.00	8.40	2.65	5.50	5.50	8.25	3.50	8.25	2.25	8.10
1909	2.90	9.50	3.00	5.50	5.70	10.50	3.70	10.50	3.75	8.00
1910	2.90	8.85	3.00	6.50	6.35	8.50	3.60	8.60	3.75	8.25
1911	2.50	9.35	3.25	5.35	6.25	9.40	4.25	12.55	3.50	8.00
1912	1.75	11.25	4.05	6.75	7.35	11.00	4.00	12.40	3.50	10.35
1913	3.00	10.25	4.50	7.65	8.00	10.00	4.50	10.00	3.00	9.60
1914.										
January	6.60	9.50	5.50	6.75	8.00	9.00	6.00	9.25	6.50	8.75
February	6.60	9.75	5.50	6.50	8.00	8.50	6.00	9.20	6.75	8.75
March	6.75	9.75	5.35	6.65	8.00	8.50	6.50	9.25	7.00	9.25
April	6.85	9.60	6.00	7.00	8.00	8.50	6.15	9.40	7.25	9.00
May	6.85	9.60	6.00	7.25	8.00	8.50	5.50	9.20	7.40	8.75
June	7.25	9.40	5.60	7.00	8.00	8.50	5.20	9.30	7.40	9.15
July	7.25	10.00	5.00	7.25	8.00	8.75	4.50	9.95	7.50	9.75
August	7.00	10.65	4.85	7.25	8.00	9.25	4.60	10.60	7.50	10.25
September	6.75	11.10	5.00	7.00	8.50	9.25	4.75	11.00	7.75	10.50
October	6.25	11.05	4.75	6.50	8.00	9.50	5.00	11.25	7.25	10.50
November	5.75	11.00	4.75	6.50	8.50	9.50	4.65	11.05	6.50	10.60
December	4.85	11.25	4.65	6.50	8.00	9.50	5.00	11.35	6.00	10.75
Year	4.85	11.25	4.65	7.25	8.00	9.50	4.50	11.35	6.00	10.75

BUTTER AND EGGS.

TABLE 150.—*Butter: Wholesale price per pound, 1900–1914.*

Date.	Elgin.		Chicago.				Cincinnati.		Milwaukee.		New York.	
	Creamery, extra.		Creamery, extra.		Dairies, firsts to extras.		Creamery, extra.		Creamery, fancy.		Creamery, extra.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
1900	18	29	15½	29	14½	25	16	27	19	29½	17½	30
1901	18½	24½	15	24½	14	20	17	24	18½	25	18	25½
1902	19	30	16	31	15½	29	17	27	19½	30½	19	33
1903	18½	29	16	28½	15	25	15½	27	18½	28½	19	29½
1904	17	28	15	28	12½	24	17	28	17	27	17½	28
1905	19½	34	18	34	16	30	19	34	19½	34	17½	35½
1906	19	31½	16½	32	15	27	19	32½	19	31½	19¼	33
1907	23	33	18	32½	18	30	23	34	23	33	23½	35
1908	21	33	19	33½	18	29	21	36	21	33½	21½	34
1909	24	36	22	35	20	30	26	38½	15	35	25	37
1910	27	36	24	36	23	30	29½	38½	18	30	27½	35
1911	21	36	18	37	16	33	23½	38½	21	36	19½	39
1912	25	40	24	40	22	34	27½	42½	25	40	26	41
1913	26	35½	24	36	24	33	30	40	26	35½	26	38
1914.												
January	28¼	35½	26½	35½	22	33	32	39½	28¼	35½	34	50
February	26½	30	26½	30	22	28	30½	34	26½	30	26½	32
March	25	30	24¾	30	21	28	29	34	25	30	24½	32
April	23½	25	24	25	20	24	27½	29	23½	25	24½	26½
May	23½	26	24½	26½	20	25	27¾	30	23½	26	25½	27
June	26½	27½	26¾	27	22	26	29½	31½	26¾	27½	26½	28
July	26	28	26	28	22	26	30	32	26	28	26½	29½
August	28	30½	28	30	22	29	32	34	28	30	28½	32
September	29	30¾	29	30	25	29	33	34½	29	31	30	32½
October	29	31½	29	32½	25	29	33	35½	29	31½	29½	33¾
November	32	33	31½	33	25	30	35½	37	31½	33	33¾	36
December	32	34	32	34	27	33½	36	38	32	34	33	35½
Year	23½	35½	24	35½	20	33½	27½	39½	23½	35½	24½	50

BUTTER AND EGGS—Continued.

TABLE 151.—*Butter: International trade, calendar years 1911–1913.*

[Butter includes all butter made from milk, melted and renovated butter, but does not include margarine, cocoa butter, or ghee. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Argentina	3,077	8,106	8,342	Netherlands	60,513	80,307	81,702
Australia	102,238	67,183	76,334	New Zealand	33,867	42,349	41,663
Austria-Hungary	4,513	3,853	3,039	Norway	3,679	3,475	2,376
Belgium	3,345	2,625	2,147	Russia	168,704	160,771	171,030
Canada	9,712	884	1,220	Sweden	48,889	46,818	46,818
Denmark	197,482	187,755	200,670	United States	6,375	5,105	3,115
Finland	27,240	26,474	27,867	Other countries	7,002	3,808	3,680
France	28,221	37,572	42,931				
Germany	555	482	602	Total	719,549	692,468	719,599
Italy	8,147	8,843	6,033				

IMPORTS.

Country.	1911	1912	1913 (prelim.).	Country.	1911	1912	1913 (prelim.).
Austria-Hungary	6,524	10,265	14,616	Germany	123,619	122,472	119,576
Belgium	15,161	15,225	14,522	Netherlands	6,039	4,636	5,529
Brazil	4,321	4,208	4,336	Russia	1,808	2,764	2,239
British South Africa	4,156	4,946	8,910	Sweden	343	273	273
Canada	1,876	7,177	7,886	Switzerland	12,098	11,930	11,155
Denmark	6,027	5,966	6,242	United Kingdom	466,720	435,247	451,736
Dutch East Indies	4,279	4,486	4,486	Other countries	35,132	30,308	36,207
Egypt	2,181	2,197	1,958				
Finland	1,315	3,388	3,333	Total	711,538	679,657	702,043
France	19,939	14,179	13,039				

BUTTER AND EGGS—Continued.

TABLE 152.—*Butter and eggs: Average price received by farmers on first of each month, by States, 1914.*

State.	Butter, cents per pound.												Eggs, cents per dozen.											
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Maine	33	32	32	31	30	29	28	30	31	31	32	33	33	32	31	22	22	22	24	26	30	33	36	45
New Hampshire	35	35	33	32	33	30	30	32	33	34	34	33	38	35	32	22	23	24	24	27	32	35	40	47
Vermont	35	34	33	31	29	27	26	29	31	33	34	34	39	34	31	22	20	22	20	23	27	29	34	41
Massachusetts	37	36	36	34	33	33	32	35	36	36	37	36	42	34	35	27	26	26	28	35	38	41	47	53
Rhode Island	36	34	35	33	32	32	32	34	35	34	36	36	40	38	38	26	21	25	27	30	34	39	45	55
Connecticut	37	35	34	34	30	34	29	34	34	37	36	36	42	38	36	26	25	26	25	30	33	38	48	49
New York	35	33	32	29	28	27	27	28	31	32	33	34	39	36	32	22	20	21	22	25	29	33	37	41
New Jersey	36	36	34	33	32	31	32	33	33	34	35	36	42	37	33	26	21	23	26	28	31	35	39	45
Pennsylvania	35	34	32	30	28	26	26	27	30	31	32	34	36	34	28	22	18	19	22	23	26	28	32	37
Delaware	32	32	34	32	30	27	31	30	...	31	34	34	31	31	28	18	18	20	21	26	25	25	33	38
Maryland	32	30	29	29	28	25	25	31	26	28	29	30	32	30	25	18	17	18	19	20	23	26	29	34
Virginia	27	27	27	26	26	23	24	23	23	25	25	26	29	27	24	18	16	17	18	18	21	24	25	30
West Virginia	28	28	28	28	27	23	23	23	25	26	26	27	31	38	26	21	18	18	19	19	21	24	25	30
North Carolina	25	24	24	25	25	23	24	23	24	24	25	25	27	23	21	17	16	17	18	18	20	23	23	28
South Carolina	28	27	25	27	26	26	24	25	25	26	25	26	29	26	22	21	20	20	20	21	20	24	24	28
Georgia	26	25	25	25	26	25	24	24	24	24	24	26	29	25	22	20	18	18	18	18	20	23	24	26
Florida	36	35	34	33	33	33	32	33	33	33	34	34	35	30	25	22	22	21	21	25	25	28	31	33
Ohio	29	28	27	26	24	22	22	24	27	27	27	29	32	30	25	17	17	18	18	19	22	25	26	32
Indiana	26	26	24	23	22	21	21	22	24	24	24	25	28	27	23	16	16	17	17	17	20	23	24	30
Illinois	28	29	26	25	24	23	23	26	27	27	27	28	29	29	25	16	16	17	16	17	19	22	23	29
Michigan	30	29	28	26	25	22	22	24	26	27	28	29	31	30	28	19	18	18	19	20	22	24	26	28
Wisconsin	33	30	29	27	25	25	25	27	29	30	30	31	30	29	26	17	17	17	17	18	21	23	24	27
Minnesota	31	30	27	25	24	24	23	24	27	27	28	31	28	26	25	16	16	16	16	17	21	22	23	27
Iowa	29	29	25	24	24	24	24	25	26	27	27	28	27	26	22	16	16	16	16	16	20	21	21	26
Missouri	25	24	23	23	21	20	20	22	23	23	23	24	28	26	23	16	16	16	14	14	17	19	20	25
North Dakota	28	26	25	20	20	20	20	20	23	26	25	27	29	26	26	16	14	14	15	15	19	21	22	26
South Dakota	29	27	24	21	21	22	22	22	25	25	26	28	29	26	22	15	15	16	15	16	18	19	22	26
Nebraska	25	25	22	21	20	20	20	21	23	24	25	26	28	26	22	16	15	15	15	15	17	19	21	25
Kansas	27	25	23	22	20	20	20	21	24	25	25	26	30	26	21	16	15	15	15	15	17	19	20	25
Kentucky	23	23	22	22	21	20	20	20	21	21	21	22	27	25	22	16	15	16	15	15	16	19	21	27
Tennessee	22	21	21	21	19	18	18	18	18	19	21	21	26	25	20	16	15	15	15	14	16	18	20	26
Alabama	24	23	22	21	21	21	22	22	23	23	21	24	28	22	20	16	16	16	16	17	18	21	22	24
Mississippi	25	24	24	24	23	22	24	23	22	23	23	23	26	22	19	17	15	16	16	16	17	21	22	23
Louisiana	29	28	28	29	26	29	28	27	29	28	27	28	28	23	21	20	17	18	18	18	19	23	23	24
Texas	25	24	22	22	21	21	21	21	23	23	22	24	27	22	18	15	14	14	15	14	17	18	19	23
Oklahoma	25	23	22	21	20	20	20	20	23	24	23	25	27	24	20	15	14	14	14	13	16	17	19	22
Arkansas	26	26	25	23	23	22	23	22	23	24	24	24	28	26	20	16	15	15	16	15	16	20	21	23
Montana	36	35	35	32	33	30	28	27	30	32	34	33	40	39	33	21	18	19	22	23	26	29	35	38
Wyoming	33	34	33	31	28	28	29	28	27	31	30	32	37	34	30	21	19	21	23	23	25	27	30	34
Colorado	30	32	29	28	27	25	25	25	28	30	31	31	38	36	25	21	19	19	21	20	26	29	31	33
New Mexico	36	36	34	36	33	35	33	32	34	35	32	33	40	36	27	25	23	26	24	25	29	29	31	33
Arizona	40	36	38	35	34	34	32	34	34	34	39	36	50	36	32	23	23	25	31	29	31	35	42	37
Utah	33	31	30	29	30	28	28	30	30	33	31	31	40	31	27	17	17	19	20	21	22	27	27	31
Nevada	43	38	35	38	34	32	35	32	36	42	34	38	52	42	32	30	29	28	30	28	37	45	45	46
Idaho	34	33	30	28	27	26	25	25	27	30	33	32	38	34	27	17	17	18	19	21	22	26	30	33
Washington	37	33	33	29	28	26	27	28	31	33	35	35	41	34	26	19	19	20	22	25	29	33	37	40
Oregon	34	35	33	31	26	28	28	29	33	31	34	34	41	35	25	20	18	19	23	24	27	31	34	39
California	35	34	29	28	26	26	27	28	29	30	34	35	45	39	25	19	21	20	24	26	29	35	41	44

BUTTER AND EGGS—Continued.

TABLE 153.—*Butter and eggs: Average price received by farmers on first of each month, by geographical divisions, 1914.*

BUTTER (CENTS PER POUND)

Divisions.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
United States	29.2	27.4	26.0	24.9	23.8	23.8	22.9	23.7	25.3	26.0	26.3	28.4
North Atlantic	35.0	33.8	32.4	30.4	28.8	27.3	27.0	28.5	30.9	31.9	32.8	34.0
South Atlantic	27.4	26.5	26.3	26.4	26.3	24.1	24.2	24.3	24.3	25.3	25.5	26.6
N. C. E. Miss. R	29.1	28.3	26.7	25.4	24.0	22.4	22.4	24.4	26.5	26.8	27.0	28.4
N. C. W. Miss. R	27.7	26.6	24.2	22.7	21.7	21.6	21.4	22.5	24.6	25.8	25.6	27.1
South Central	24.3	23.5	22.5	22.1	21.2	20.7	21.1	20.9	22.0	22.4	22.1	23.3
Far Western	34.7	33.5	30.9	29.1	27.4	25.1	27.0	27.6	29.7	31.0	33.3	34.0

EGGS (CENTS PER DOZEN).

Divisions.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
United States	30.7	28.4	24.2	17.6	16.8	17.3	17.6	18.2	21.0	23.5	25.3	20.7
North Atlantic	38.4	34.9	31.0	22.8	20.2	21.2	23.0	25.5	29.0	32.1	36.5	41.6
South Atlantic	29.6	28.1	23.6	19.0	17.4	17.9	18.7	19.2	21.1	24.1	25.6	20.3
N. C. E. Miss. R	30.0	29.0	25.2	16.8	16.7	17.4	17.3	18.1	20.7	23.4	24.6	29.6
N. C. W. Miss. R	28.2	26.0	22.6	15.9	15.6	15.6	15.1	15.3	18.4	19.9	20.9	25.6
South Central	27.0	23.7	19.8	15.9	14.8	15.0	15.2	14.7	16.6	18.9	20.3	24.1
Far Western	42.3	36.5	26.0	19.5	19.6	20.7	22.8	24.3	27.5	32.1	30.4	30.6

TABLE 154.—*Butter: Receipts at seven leading markets in the United States, 1891–1914.*

[From Board of Trade, Chamber of Commerce, and Merchants' Exchange Reports.]

[000 omitted.]

Year.	Boston.	Chicago.	Milwaukee.	St. Louis.	San Francisco.	Total 5 cities.	Cincinnati.	New York.
Averages:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Packages.*	*Packages.*
1891–1895	40,955	145,225	3,996	13,944	15,240	219,360	88	1,741
1896–1900	50,790	232,289	5,096	14,582	14,476	317,234	157	2,010
1901–1905	57,716	245,203	7,164	14,685	15,026	339,793	177	2,122
1906–1910	66,612	286,518	8,001	17,903	13,581	392,615	169	2,207
1901	57,500	253,809	5,590	13,477	14,972	345,348	238	2,040
1902	54,574	219,233	7,290	14,573	14,801	310,471	223	1,933
1903	54,347	232,032	6,857	14,080	13,570	320,886	121	2,113
1904	55,435	249,024	7,993	15,727	14,336	342,515	147	2,170
1905	66,725	271,915	8,091	15,566	17,450	379,747	155	2,355
1906	65,152	248,648	8,209	13,198	9,282	344,489	205	2,242
1907	63,599	263,715	8,219	13,453	16,725	365,701	187	2,113
1908	69,843	316,695	8,799	18,614	13,528	427,478	166	2,175
1909	65,054	284,547	7,458	21,086	14,449	392,594	150	2,250
1910	69,421	318,986	7,319	23,163	13,922	432,811	135	2,267
1911	63,874	334,932	8,632	24,539	17,606	449,583	162	2,405
1912	72,109	295,213	7,007	20,521	28,172	414,022	109	2,436
1913	70,737	277,651	9,008	24,726	23,123	405,304	103	2,517
1914	73,028	307,899	9,496	24,614	22,421	437,458	62	2,513
1914.								
January	3,541	15,407	569	2,001	1,932	23,450	3	172
February	2,911	16,802	514	2,044	1,890	23,961	5	149
March	4,171	19,034	939	2,059	2,107	28,310	6	202
April	4,311	22,279	724	2,111	2,811	32,236	5	192
May	7,327	24,243	1,054	2,353	2,435	37,412	6	235
June	13,701	45,716	1,203	2,161	1,864	64,765	8	345
July	13,685	39,449	1,102	1,991	1,872	57,099	8	295
August	7,457	30,678	708	2,130	1,766	42,739	6	223
September	5,932	30,162	788	1,908	1,330	40,115	8	223
October	4,902	26,007	735	2,074	1,464	35,182	10	179
November	5,208	19,446	657	1,763	1,315	28,391	7	152
December	2,882	18,674	505	1,999	1,735	25,795	10	136

BUTTER AND EGGS—Continued.

Table 155.—*Eggs: Receipts at seven leading markets in the United States, 1891–1914.*

[From Board of Trade, Chamber of Commerce, and Merchants' Exchange Reports.]

Year.	Boston.	Chicago.	Cincinnati.	Milwaukee.	New York.	St. Louis.	San Francisco.	Total.
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
Averages:								
1891–1895	722,363	1,879,065	288,548	90,943	2,113,946	557,320	166,059	5,818,244
1896–1900	912,807	2,196,631	362,262	113,327	2,664,074	852,457	194,087	7,295,645
1901–1905	1,155,340	2,990,675	418,842	139,718	3,057,298	1,000,935	304,933	9,067,741
1906–1910	1,517,995	4,467,040	509,017	180,362	4,046,360	1,304,719	334,766	12,360,259
1901	1,040,555	2,783,709	493,218	128,179	2,909,194	1,022,646	277,500	8,655,001
1902	1,053,165	2,659,340	464,799	114,732	2,743,642	825,999	285,058	8,146,735
1903	1,164,777	3,279,248	338,327	129,278	2,940,091	959,648	335,228	9,146,597
1904	1,122,819	3,113,858	377,263	166,409	3,215,924	1,216,124	319,637	9,532,034
1905	1,395,385	3,117,221	420,604	159,990	3,477,638	980,257	307,243	9,858,338
1906	1,709,531	3,583,878	484,208	187,561	3,981,013	1,023,125	137,074	11,106,390
1907	1,594,576	4,780,356	588,636	176,826	4,262,153	1,288,977	379,439	12,070,963
1908	1,436,786	4,569,014	441,072	207,558	3,703,990	1,439,868	347,436	12,145,724
1909	1,417,397	4,557,906	519,652	160,418	3,903,867	1,395,987	340,185	12,295,412
1910	1,431,686	4,844,045	511,519	169,448	4,380,777	1,375,638	469,698	13,182,811
1911	1,441,748	4,707,335	605,131	175,270	5,021,757	1,736,915	587,115	14,275,271
1912	1,580,106	4,556,643	668,942	136,621	4,723,558	1,391,611	638,920	13,696,401
1913	1,589,399	4,593,800	594,954	187,931	4,666,117	1,397,962	574,222	13,604,385
1914	1,531,329	4,083,163	461,783	221,345	4,762,174	1,470,716	619,508	13,150,018
1914.								
January	36,836	94,132	14,116	5,250	188,287	49,085	34,053	421,759
February	80,664	205,582	36,811	7,121	269,662	83,373	56,000	739,203
March	116,623	380,914	45,912	20,779	466,450	195,978	79,055	1,305,711
April	221,044	809,450	68,725	51,318	755,953	222,689	84,585	2,213,764
May	290,845	299,211	73,740	54,859	778,391	178,387	70,773	1,746,206
June	234,724	648,343	54,558	22,282	587,840	130,517	57,715	1,730,979
July	150,373	464,630	35,146	19,165	386,845	127,110	51,526	1,234,795
August	115,013	359,505	29,415	15,748	365,261	114,357	45,350	1,044,649
September	98,093	297,007	16,599	10,052	349,731	117,392	37,006	925,880
October	71,264	231,269	26,059	6,965	277,881	104,131	31,727	749,296
November	63,476	168,682	26,459	4,702	176,366	81,231	29,283	550,199
December	52,374	129,438	34,243	3,104	159,517	66,466	42,435	487,577

BUTTER AND EGGS—Continued.

TABLE 156.—*Eggs: Wholesale price per dozen, 1900–1914.*

Date.	Chicago. Fresh.		Cincinnati.		St. Louis. Average best fresh.		Milwaukee. Fresh.		New York. Average best fresh.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
1900	10	26	9	22	8	23	10	24	12	29
1901	10	28	9	27	6	25	10	24	13	31
1902	13¾	32½	13	32	11¼	32	13½	30	15½	37
1903	10	30	12	28	11	28½	12½	27	15	45
1904	11	34½	14½	32	13	29	13½	32	16	47
1905	12	36	14	30	10½	34	14	31	16½	40
1906	11	36	13	29	11½	26	12½	33	14½	45
1907	13	30	13½	29	12	25½	12½	28	16	50
1908	14	33	13	36	12½	29	13	32	15	55
1909	17½	36½	17	37	16	40	14	34	19	55
1910	15	38	17	40	14½	35	10	30	22	55
1911	12	32	12½	39	11	29	11	32	17	60
1912	17	40	17	40	14½	39	15	38	20½	60
1913	16	37	15½	42	12	35	13	35	20	65
1914.			(1)							
January	29	32½	26½	36	27	31	27	30	34	50
February	24¾	27¾	23½	28	24½	28	24	28	29	40
March	17¾	29¼	17	29	17¼	27	16	27	21	36
April	17	19¼	16½	18½	17	18½	16	18	20	26
May	18	19¼	17¼	18¾	17¼	18¾	15½	18	22	24
June	17¾	18¾	18	19	14	18	15	16½	22½	28
July	18	19¼	18½	19½	18	19	16	19	24	31
August	19	23¼	19	24	19	21½	18½	22	27	36
September	20¼	23¼	24	26¼	20½	22¼	20	22	30	42
October	20¼	28½	24	28¼	20	24½	19	25	31	55
November	26½	30	29	35¼	24½	29	21	29	36	62
December	28	36	33	38½	27	35	24	32	41	62
Year	17	36	16½	38½	14	35	15	32	20	62

[1] Prime firsts.

CHEESE.

TABLE 157.—*Cheese: International trade, calendar years 1911–1913.*

Cheese includes all cheese made from milk; "cottage cheese," of course, is included. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	1911	1912	1913	Country.	1911	1912	1913
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Bulgaria	7,549	4,030	4,030	Russia	8,945	7,455	7,45
Canada	169,170	154,345	148,849	Switzerland	66,593	66,435	78,73
France	24,041	27,690	37,386	United States	13,781	3,006	2,65
Germany	2,179	1,812	1,603	Other countries	10,656	9,982	13,45
Italy	61,403	67,505	72,254				
Netherlands	113,607	131,107	145,337	Total	527,120	537,999	580,26
New Zealand	49,187	64,632	68,506				

IMPORTS.

Country.	1911	1912	1913	Country.	1911	1912	1913
Algeria	6,205	6,747	6,747	Germany	45,954	47,277	57,90
Argentina	10,845	11,849	11,122	Italy	11,915	10,069	12,34
Australia	319	444	365	Russia	4,009	3,853	4,37
Austria-Hungary	12,473	12,797	13,200	Spain	4,929	5,180	5,96
Belgium	29,649	31,352	35,845	Switzerland	7,644	7,995	7,78
Brazil	3,931	6,280	4,196	United Kingdom	257,134	250,823	249,97
British S. Africa	5,039	5,242	5,694	United States	45,447	48,929	55,59
Cuba	4,252	4,232	5,209	Other countries	22,216	19,491	20,21
Denmark	1,203	1,295	1,475				
Egypt	8,928	7,425	6,375	Total	531,593	528,838	556,18
France	49,428	47,558	51,646				

CHICKENS.

TABLE 158.—*Chickens: Average price per pound received by farmers on first of month indicated, 1913 and 1914.*

State.	1913						1914											
	Feb.	Apr.	June.	Aug.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Me	15.0	13.4	15.2	16.4	14.0	14.5	14.9	14.9	15.5	14.5	15.0	14.4	15.7	15.9	14.4	14.7	14.0	14.0
N. H	14.2	15.0	14.7	15.3	14.7	15.5	15.3	15.0	15.8	13.6	15.9	14.7	14.5	16.0	16.0	15.0	14.7	15.0
Vt	12.0	13.6	13.2	13.6	14.4	14.2	13.8	14.1	13.9	13.2	13.8	14.0	14.1	14.0	14.3	14.1	14.6	14.5
Mass	15.2	15.7	17.8	17.0	18.0	17.3	15.8	16.0	16.5	17.2	17.6	17.4	16.6	18.5	19.5	19.1	17.0	17.3
R. I	19.0	16.5	15.5	15.0	19.0	18.0	18.0	20.0	17.0	18.0	17.7	18.0	24.0	21.0	17.0	19.5	16.0	16.5
Conn	16.0	16.0	16.0	17.5	16.5	17.5	16.0	17.0	17.6	16.6	17.2	16.5	17.0	18.0	18.0	18.5	18.0	17.7
N. Y	14.7	14.9	15.5	16.0	16.7	15.0	14.5	15.2	15.1	15.8	16.0	15.7	16.4	16.2	16.2	16.9	15.3	14.5
N. J	17.2	17.0	18.0	18.0	18.7	17.8	17.6	16.2	17.3	17.9	17.1	17.6	17.9	18.9	18.7	18.0	17.9	17.0
Pa	12.4	14.0	14.3	14.8	14.6	13.7	13.9	14.0	14.0	14.6	14.8	14.8	15.0	15.6	15.7	14.9	14.6	13.5
Del	12.5	14.3	14.7	12.0	15.0	14.5	13.0	12.5	14.5	14.5	14.5	15.0	14.5	19.0	15.0	15.5	13.7	13.0
Md	14.1	15.3	14.1	16.5	16.5	14.8	15.0	14.4	15.3	16.2	16.1	16.5	17.0	16.6	16.0	15.9	14.6	14.0
Va	12.9	13.6	14.7	14.9	14.7	13.8	13.6	14.3	14.5	14.5	15.0	14.9	15.3	15.2	14.8	14.2	13.5	13.2
W. Va	11.7	11.9	12.4	14.5	13.9	13.4	12.8	12.9	13.1	13.4	13.4	12.8	13.6	13.9	14.1	13.9	14.0	13.0
N. C	10.4	10.8	12.0	12.6	11.9	12.0	11.5	11.6	11.9	11.7	12.5	12.9	13.0	13.1	13.3	12.6	12.4	12.0
S. C	12.5	11.9	11.8	13.0	14.0	15.0	13.3	12.9	12.6	13.5	15.0	13.5	14.1	13.2	12.8	13.1	13.4	12.8
Ga	12.4	12.7	13.1	13.0	13.2	13.9	13.5	13.3	12.9	13.2	13.7	14.0	14.3	14.4	13.9	13.5	14.1	13.3
Fla	15.0	15.0	15.8	15.5	15.7	17.8	16.6	15.4	15.7	15.2	16.0	15.4	16.6	17.0	17.5	16.7	16.1	18.0
Ohio	11.3	12.3	12.7	13.0	13.0	11.3	11.5	12.1	13.2	13.1	13.2	13.0	13.0	13.3	13.3	12.9	11.8	11.1
Ind	10.7	11.8	11.9	12.0	12.1	10.5	10.7	11.2	11.9	12.0	12.5	12.0	11.7	12.4	12.3	12.2	10.9	10.2
Ill	10.2	11.4	11.5	11.7	11.9	10.7	10.9	11.2	11.5	12.1	12.2	12.5	12.4	12.3	12.3	11.9	11.1	10.6
Mich	10.9	12.3	12.3	12.4	12.6	10.9	11.4	11.3	12.5	13.0	12.8	12.9	12.5	12.8	13.0	12.6	12.0	10.5
Wis	10.9	11.8	11.4	12.0	12.5	10.9	11.2	11.3	11.4	11.3	12.5	12.5	12.2	12.4	12.7	12.4	11.4	10.5
Minn	9.1	10.3	10.3	10.6	11.2	10.4	10.2	10.1	10.4	10.8	11.0	10.6	10.9	11.3	11.4	11.0	10.1	9.3
Iowa	9.9	10.3	10.7	10.9	11.9	9.9	10.1	10.7	10.7	10.9	10.7	10.8	10.7	11.5	11.8	11.3	10.2	9.5
Mo	9.6	11.1	11.5	11.3	11.4	9.9	10.3	10.6	11.5	11.8	12.2	12.0	11.9	11.5	11.6	11.2	10.5	10.0
N. Dak	9.7	9.8	10.4	10.5	11.1	10.0	9.9	10.2	10.6	10.2	10.2	10.2	10.4	10.4	11.6	11.0	9.6	9.7
S. Dak	7.9	8.9	8.8	9.3	9.5	9.0	9.9	9.3	9.0	8.8	9.3	9.4	9.6	9.7	10.2	9.9	9.9	9.1
Nebr	9.4	9.7	10.4	10.7	10.7	9.6	9.5	9.5	9.9	10.7	10.6	10.1	10.6	10.7	11.0	10.5	9.9	9.3
Kans	8.9	9.5	10.2	10.3	10.3	9.2	9.8	9.7	10.6	10.5	10.7	10.6	10.6	10.4	10.1	10.6	10.0	9.5
Ky	10.2	11.4	12.0	12.8	11.8	10.5	11.0	11.0	11.6	11.7	12.0	11.8	12.5	12.9	12.0	11.4	10.8	10.5
Tenn	9.8	11.1	12.0	11.9	11.5	10.3	10.8	10.6	11.8	11.7	12.0	12.4	12.6	12.6	11.8	11.5	10.7	10.2
Ala	11.5	11.7	13.0	13.0	13.1	12.3	12.1	12.5	12.4	12.2	12.5	13.0	13.6	14.0	13.2	13.6	13.4	13.3
Miss	11.5	11.8	12.4	13.1	12.1	13.0	11.9	11.5	12.3	12.5	12.5	13.0	13.7	12.7	12.9	12.3	13.2	12.4
La	12.9	12.7	12.9	13.9	13.5	13.5	14.6	13.3	14.7	13.5	12.9	12.9	14.4	13.0	14.0	13.6	14.0	13.7
Tex	9.2	9.3	9.6	10.3	10.8	10.0	9.8	9.9	9.7	9.9	10.0	10.4	11.1	10.6	10.7	10.5	10.7	10.0
Okla	8.8	9.4	9.8	9.9	9.8	9.0	9.2	9.6	10.4	10.1	10.4	10.0	10.2	9.9	10.1	9.7	9.5	9.3
Ark	9.5	10.0	10.8	11.0	10.9	10.1	10.4	10.1	11.0	10.6	10.8	11.2	12.4	12.2	11.0	12.5	10.3	9.7
Mont	13.7	13.7	14.1	13.9	13.9	14.0	13.4	12.9	12.6	13.3	13.0	14.0	18.7	13.3	13.2	14.4	15.0	13.0
Wyo	13.3	13.5	13.1	13.2	13.4	13.2	11.7	11.3	12.0	12.7	11.7	12.0	12.9	13.5	10.6	14.1	12.6	14.0
Colo	13.1	13.2	11.7	13.6	13.9	13.0	12.8	13.1	13.0	12.6	12.8	13.0	13.7	12.8	14.0	14.1	14.6	13.0
N. Mex	12.5	12.1	13.0	14.5	14.3	13.0	13.4	15.0	13.0	13.2	13.8	15.0	13.9	13.2	14.0	13.9	14.7	13.8
Ariz	18.0	20.0	17.2	19.0	17.8	18.0	18.1	17.3	19.5	15.8	17.0	18.7	18.5	17.0	19.4	18.2	17.8	17.0
Utah	12.5	12.3	13.2	13.9	12.6	12.8	11.8	13.0	12.3	13.0	13.1	13.2	13.7	14.4	13.1	13.3	12.1	12.6
Nev	21.7	19.8	25.0	21.0	20.0	21.0	23.0	19.0	22.5	22.8	22.0	19.3	20.9	18.0	22.0	21.0	21.0	24.0
Idaho	12.4	10.9	11.5	12.0	12.9	12.0	11.4	11.7	10.1	11.0	10.1	11.2	12.6	11.8	12.0	11.7	11.0	11.2
Wash	13.1	13.9	13.6	13.7	13.8	13.2	12.7	13.8	14.5	14.5	14.6	14.6	13.6	13.7	13.8	13.2	12.0	12.6
Oreg	12.1	12.5	12.2	12.9	12.4	12.8	13.1	12.8	13.5	13.8	13.9	14.1	13.4	13.2	13.7	13.8	13.3	12.0
Cal	13.8	13.5	14.9	15.0	15.4	16.0	15.9	16.0	14.9	15.2	15.0	15.6	16.2	16.0	16.0	15.5	16.0	16.5
United States	10.9	11.6	12.0	12.4	12.5	11.5	11.5	11.7	12.1	12.3	12.5	12.5	12.7	12.8	12.7	12.5	11.9	11.3

SHEEP AND WOOL.

TABLE 159.—*Sheep: Number and value on farms in the United States, 1867–1915.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of numbers are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available. It should also be observed that the census of 1910, giving numbers as of Apr. 15, is not strictly comparable with former censuses, which related to numbers June 1.

Year.	Number.	Price per head Jan. 1.	Farm value Jan. 1.
1867	39,385,000	$2.50	$98,644,000
1868	38,992,000	1.82	71,053,000
1869	37,724,000	1.64	62,037,000
1870	40,853,000	1.96	79,876,000
1870, census, June 1	*28,477,951*		
1871	31,851,000	2.14	68,310,000
1872	31,679,000	2.61	82,768,000
1873	33,002,000	2.71	89,427,000
1874	33,938,000	2.43	82,353,000
1875	33,784,000	2.55	86,278,000
1876	35,935,000	2.37	85,121,000
1877	35,804,000	2.13	76,362,000
1878	35,740,000	2.21	78,898,000
1879	*38,124,000*	*2.07*	*78,965,000*
1880	40,766,000	2.21	90,231,000
1880, census, June 1	*35,192,074*		
1881	43,570,000	2.39	104,071,000
1882	45,016,000	2.37	106,596,000
1883	*49,237,000*	*2.53*	*124,366,000*
1884	50,627,000	2.37	119,903,000
1885	50,360,000	2.14	107,961,000
1886	*48,322,000*	*1.91*	*92,444,000*
1887	44,759,000	2.01	89,873,000
1888	43,545,000	2.05	89,280,000
1889	42,599,000	2.13	90,640,000
1890	44,336,000	2.27	100,660,000
1890, census, June 1	*35,935,364*		
1891	43,431,000	2.50	108,397,000
1892	44,938,000	$2.58	$116,121,000
1893	47,274,000	2.66	125,909,000
1894	45,048,000	1.98	89,186,000
1895	42,294,000	1.58	66,686,000
1896	38,299,000	1.70	65,168,000
1897	36,819,000	1.82	67,021,000
1898	37,657,000	2.46	92,721,000
1899	39,114,000	2.75	107,698,000
1900	41,883,000	2.93	122,666,000
1900, census, June 1	*61,503,713*		
1901 [1]	59,757,000	2.98	178,072,000
1902	62,039,000	2.65	164,446,000
1903	63,965,000	2.63	168,316,000
1904	*51,630,000*	*2.59*	*133,530,000*
1905	45,170,000	2.82	127,332,000
1906	50,632,000	3.54	179,056,000
1907	*53,240,000*	*3.84*	*204,210,000*
1908	54,631,000	3.88	211,736,000
1909	56,084,000	3.43	192,632,000
1910	*57,216,000*		
1910, census, Apr. 15	*52,447,861*	4.12	216,030,000
1911 [1]	*53,633,000*	3.91	*209,535,000*
1912	52,362,000	3.46	181,170,000
1913	51,482,000	3.94	202,779,000
1914	49,719,000	4.04	200,803,000
1915	49,956,000	4.50	224,687,000

[1] Estimates of numbers revised, based on census data.

SHEEP AND WOOL—Continued.

TABLE 160.—*Sheep: Number and value on farms Jan. 1, 1914 and 1915, by States.*

State.	Number (thousands) Jan. 1—		Average price per head Jan. 1—		Farm value (thousands of dollars) Jan. 1—	
	1915	1914	1915	1914	1915	1914
Maine	165	177	$4.50	$4.30	742	761
New Hampshire	38	39	4.90	4.40	186	172
Vermont	105	111	5.10	4.80	536	533
Massachusetts	30	31	5.60	5.30	168	164
Rhode Island	7	7	5.20	5.40	36	38
Connecticut	19	20	5.70	5.40	108	108
New York	849	875	5.80	5.40	4,924	4,725
New Jersey	31	31	6.00	5.60	186	174
Pennsylvania	831	839	5.30	4.90	4,404	4,111
Delaware	8	8	5.30	5.10	42	41
Maryland	223	223	5.20	5.00	1,160	1,115
Virginia	720	735	4.50	4.50	3,240	3,308
West Virginia	796	788	4.50	4.30	3,582	3,388
North Carolina	177	177	3.30	3.20	584	566
South Carolina	32	33	2.60	2.60	83	86
Georgia	163	166	2.30	2.10	375	349
Florida	119	118	2.20	1.90	262	224
Ohio	3,203	3,263	4.70	4.30	15,336	14,031
Indiana	1,114	1,238	5.40	4.90	6,016	6,066
Illinois	935	984	5.40	5.00	5,049	4,920
Michigan	2,033	2,118	5.00	4.60	10,165	9,743
Wisconsin	781	789	5.00	4.70	3,905	3,708
Minnesota	564	570	4.60	4.40	2,594	2,508
Iowa	1,249	1,249	5.60	5.30	6,994	6,620
Missouri	1,490	1,568	5.00	4.20	7,450	6,586
North Dakota	250	278	4.50	4.20	1,125	1,168
South Dakota	636	617	4.50	4.00	2,862	2,468
Nebraska	374	374	4.80	4.50	1,795	1,683
Kansas	316	316	4.90	4.50	1,548	1,422
Kentucky	1,229	1,267	4.20	4.20	5,162	5,321
Tennessee	674	688	3.70	3.40	2,494	2,339
Alabama	119	124	2.30	2.40	274	298
Mississippi	208	202	2.20	2.30	458	465
Louisiana	180	180	2.20	2.20	396	396
Texas	2,114	2,052	3.20	2.90	6,765	5,951
Oklahoma	76	75	4.20	4.00	319	300
Arkansas	130	124	2.60	2.60	338	322
Montana	4,379	4,293	4.40	3.70	19,268	15,884
Wyoming	4,427	4,472	4.70	4.10	20,807	18,335
Colorado	1,751	1,668	4.40	3.70	7,704	6,172
New Mexico	3,340	3,036	3.50	3.00	11,690	9,108
Arizona	1,761	1,601	4.00	3.60	7,044	5,764
Utah	2,068	1,970	4.50	3.90	9,306	7,683
Nevada	1,532	1,517	4.90	4.50	7,507	6,826
Idaho	3,041	2,981	4.70	4.20	14,293	12,520
Washington	546	506	4.80	4.40	2,621	2,226
Oregon	2,563	2,670	4.50	3.90	11,534	10,413
California	2,500	2,551	4.50	3.80	11,250	9,694
United States	49,956	49,719	4.50	4.04	224,687	200,803

SHEEP AND WOOL—Continued.

TABLE 161.—*Sheep: Imports, exports, and prices, 1892–1914.*

Year ending June 30—	Imports.			Exports.		
	Number.	Value.	Average import price.	Number.	Value.	Average export price.
1892	380,814	$1,440,530	$3.78	46,960	$161,105	$3.43
1893	459,484	1,682,977	3.66	37,260	126,394	3.39
1894	242,568	788,181	3.25	132,370	832,763	6.29
1895	291,461	682,618	2.34	405,748	2,630,686	6.48
1896	322,692	853,530	2.65	491,565	3,076,384	6.26
1897	405,633	1,019,668	2.51	244,120	1,531,645	6.27
1898	392,314	1,106,322	2.82	199,690	1,213,886	6.08
1899	345,911	1,200,081	3.47	143,286	853,555	5.96
1900	381,792	1,365,026	3.58	125,772	733,477	5.83
1901	331,488	1,236,277	3.73	297,925	1,933,000	6.49
1902	266,953	956,710	3.58	358,720	1,940,060	5.41
1903	301,623	1,036,934	3.44	176,961	1,067,860	6.03
1904	238,094	815,289	3.42	301,313	1,954,604	6.49
1905	186,942	704,721	3.77	268,365	1,687,321	6.29
1906	240,747	1,020,359	4.24	142,690	804,090	5.64
1907	224,798	1,120,425	4.98	135,344	750,242	5.54
1908	224,765	1,082,606	4.82	101,000	589,285	5.83
1909	102,663	502,040	4.90	67,656	365,155	5.40
1910	126,152	696,879	5.52	44,517	209,000	4.69
1911	53,455	377,625	7.06	121,491	636,272	5.24
1912	23,588	157,257	6.67	157,263	626,985	3.99
1913	15,428	90,021	5.83	187,132	605,725	3.24
1914	223,719	532,404	2.38	152,598	534,543	3.50

TABLE 162.—*Sheep: Wholesale price per 100 pounds, 1900–1914.*

Date.	Chicago.		Cincinnati.		St. Louis.		Kansas City.		Omaha.	
	Native.		Good to extra.		Good to choice natives.		Native.		Western.[1]	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1900	$2.00	$6.50	$1.25	$6.00	$3.40	$6.25	$2.75	$6.50	$2.00	$6.10
1901	1.40	5.25	2.10	5.00	3.00	5.10	1.50	5.00	2.00	5.00
1902	1.25	6.50	2.50	5.75	3.65	6.35	2.00	6.50	2.00	6.25
1903	1.25	7.00	2.60	6.25	3.50	6.25	2.25	6.80	3.00	6.75
1904	1.50	6.00	2.75	4.60	3.75	5.65	2.00	6.00	2.25	5.90
1905	2.75	4.50	3.60	5.50	4.60	6.35	2.75	6.90	2.50	6.90
1906	3.00	6.50	3.85	5.75	5.00	6.45	2.50	6.75	2.75	6.50
1907	2.00	7.00	3.65	5.90	4.25	7.00	2.25	7.75	3.00	7.75
1908	1.50	7.00	2.75	5.50	4.10	6.90	1.50	7.15	1.25	7.40
1909	2.00	6.90	3.35	5.75	4.25	6.65	2.00	8.00	2.00	6.70
1910	1.50	9.00	3.00	7.00	3.75	8.75	2.00	9.50	2.00	8.25
1911	1.25	5.25	2.40	5.15	3.50	5.00	1.50	6.25	2.50	6.20
1912	1.50	8.25	2.85	5.50	3.75	7.00	[2] 3.30	[2] 8.00	3.00	8.00
1913	2.00	7.50	3.25	7.00	4.00	7.25	2.00	7.50	2.75	8.15
1914.							(3)			
January	3.25	6.00	4.10	5.00	5.35	5.85	3.00	7.00	5.00	7.00
February	3.50	6.50	4.35	5.50	5.25	6.45	3.00	6.25	5.25	6.60
March	3.50	6.75	5.00	5.85	6.20	6.40	3.25	5.70	5.40	6.25
April	3.50	7.00	5.00	6.15	6.50	6.50	3.25	6.75	6.00	7.50
May	2.75	6.50	4.50	5.25	5.50	6.25	3.00	7.25	5.40	6.80
June	2.00	6.50	4.50	5.00	6.00	5.00	2.50	7.25	5.35	7.25
July	2.00	6.10	4.25	4.85	4.50	5.00	2.50	6.65	5.00	6.25
August	2.00	6.00	4.25	5.00	4.50	5.25	2.25	7.00	4.90	7.25
September	2.50	6.00	4.25	5.25	5.00	5.50	3.00	6.00	4.80	6.50
October	2.50	6.00	4.25	5.25	5.00	5.50	3.00	6.00	5.00	6.40
November	3.00	6.25	4.25	5.35	5.35	5.75	3.25	6.50	5.60	8.00
December	3.00	6.50	4.00	5.00	5.25	5.50	2.75	7.50	5.40	7.65
Year	2.00	7.00	4.00	6.15	4.50	6.50	2.25	7.50	4.80	8.00

SHEEP AND WOOL—Continued.

TABLE 163.—*Wool: Product, by States, 1914, and United States totals 1899–1914.*[1]

State and year.	Number of fleeces.	Average weight of fleece.	Wool product, raw.[2]	Per cent of shrinkage.[2]	Wool scoured.[2]
		Pounds.	*Pounds.*	*Per cent.*	*Pounds.*
Maine	149,000	6.1	906,000	42	525,480
New Hampshire	32,000	6.2	201,000	43	114,570
Vermont	88,000	6.5	571,000	48	296,920
Massachusetts	21,000	6.2	131,000	43	74,670
Rhode Island	6,000	5.0	30,000	42	17,400
Connecticut	15,000	5.5	82,000	42	47,560
New York	550,000	6.3	3,464,000	50	1,732,000
New Jersey	18,000	5.5	97,000	42	56,260
Pennsylvania	671,000	5.9	3,959,000	52	1,900,320
Delaware	5,000	5.4	26,000	42	15,800
Maryland	126,000	6.0	755,000	42	437,900
Virginia	430,000	4.6	1,978,000	36	1,265,920
West Virginia	668,000	5.1	3,406,000	50	1,703,000
North Carolina	141,000	3.9	550,000	40	330,000
South Carolina	28,000	3.9	109,000	40	65,400
Georgia	207,000	2.8	580,000	40	348,000
Florida	105,000	3.1	325,000	38	201,500
Ohio	2,098,000	6.6	13,844,000	52	6,645,120
Indiana	775,000	6.4	4,961,000	45	2,728,550
Illinois	550,000	7.0	3,853,000	47	2,042,090
Michigan	1,191,000	6.8	8,098,000	50	4,049,000
Wisconsin	568,000	7.1	4,031,000	46	2,176,740
Minnesota	422,000	7.4	3,124,000	49	1,593,240
Iowa	709,000	7.5	5,319,000	49	2,712,690
Missouri	1,071,000	6.7	7,179,000	45	3,948,450
North Dakota	224,000	7.5	1,677,000	61	654,030
South Dakota	479,000	7.4	3,547,000	61	1,383,330
Nebraska	235,000	7.6	1,789,000	62	679,820
Kansas	200,000	7.0	1,403,000	64	505,080
Kentucky	775,000	4.7	3,643,000	37	2,295,090
Tennessee	465,000	4.2	1,953,000	40	1,171,800
Alabama	108,000	3.8	411,000	39	250,710
Mississippi	148,000	3.6	533,000	39	325,130
Louisiana	140,000	4.0	560,000	39	341,600
Texas	1,490,000	5.8	8,643,000	64	3,111,480
Oklahoma	70,000	5.9	411,000	65	143,850
Arkansas	90,000	4.5	406,000	40	243,600
Montana	3,869,000	7.8	30,177,000	63	11,165,490
Wyoming	3,560,000	8.0	28,476,000	67	9,397,080
Colorado	1,317,000	5.4	7,111,000	61	2,773,291
New Mexico	3,233,000	5.9	19,077,000	66	6,486,180
Arizona	850,000	6.5	5,521,000	63	2,042,770
Utah	1,770,000	7.4	13,100,000	62	4,978,000
Nevada	744,000	7.4	5,502,000	67	1,815,660
Idaho	1,896,000	7.8	14,792,000	62	5,620,960
Washington	455,000	8.0	3,638,000	68	1,164,160
Oregon	1,970,000	8.0	15,763,000	67	5,201,790
California	1,852,000	6.2	11,480,000	65	4,100,800
United States	36,584,000	6.8	290,192,000	54.6	131,840,680
1913	36,319,000	6.95	296,175,300	55	132,022,080
1912	38,481,000	6.82	304,043,400	55	136,866,652
1911	39,761,000	6.98	318,547,900	60.4	139,896,195
1910	41,999,500	6.70	321,362,750	50	141,805,813
1909	42,293,205	6.80	328,110,749	60.9	142,223,785
1908	40,311,548	6.70	311,138,321	60.5	135,330,648
1907	38,864,931	6.60	298,294,750	60.6	130,359,118
1906	38,540,798	6.66	298,915,130	61.1	129,410,942
1905	38,621,476	6.56	295,488,438	61.3	126,527,121
1904	38,342,072	6.50	291,783,032	61.6	123,935,147
1903	39,284,000	6.25	287,450,000	60.8	124,366,405
1902	42,184,122	6.50	316,346,032	60	137,912,085
1901	41,920,900	6.33	302,502,328	60.6	126,814,690
1900	40,267,818	6.46	288,636,621	61.1	118,223,190
1899	36,905,497	6.46	272,191,330	60.7	113,958,468

[1] The estimate of the wool production for 1914 is that of the U. S. Department of Agriculture; other figures estimates of National Association of Wool Manufacturers.

[2] Totals include pulled wool.

SHEEP AND WOOL—Continued.

TABLE 164.—*Wool: Wholesale price per pound in Boston, 1900–1914.*

Date.	Ohio fine, unwashed.		Kentucky quarter blood, unwashed.		Ohio XX, washed.		Ohio half blood combing, washed.		Ohio Delaine, washed.		Michigan fine, unwashed.[1]	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cts.	*Cts*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
1900	18	26	23	29	27	38	28	30	27½	40	21½	29
1901	16½	19½	19½	24	26	28	25	29	27½	30	17½	21
1902	19	23	20½	24	27	32	26	31	28	35	18	22
1903	20	25	22	25	30	35	29	34	33½	37	21	27½
1904	21	25	24	33	32	36	30	40	34	38	19	22
1905	23	30	30	37	34	37	36	43	36	40	20	27
1906	24	28	30	34	33½	36	37	41	35½	37½	24	26½
1907	25	28	29	34	33	35	38	41	36	39	23	26
1908	19	27	20	30	30	35	31	40	31	39	18	25
1909	23	28	27	37	34	38	38	41	37	42	22	26
1910	20	28	24	36	30	38	27	41	34	40	19	26
1911	18	22	22½	27	27	32	25	30	29	34	17	21
1912	21	25	22½	33	28	33	26	30	30	35	19	23
1913	20	24	23½	32	25	32	23	29	26	34	19	23
1914.												
January	20	21½	23½	23½	25½	26½	23	23½	26	27	19	20
February	21½	22	23½	23½	26½	26½	28	25	27	27½	20	21
March	22	22	23½	23½	26½	27	24	25	27½	28	21	21
April	22	22	23½	25	27	27	24½	25	27½	28	21	21
May	22	23	25	27	27	28	24½	27½	27½	30	21	22
June	24	25	26	27	28	29	27	28	30	32	22	23
July	24	25	26	27	28	31	27	28	31	32	22	23
August	25	25	26	27	29	31	28	28½	32	32	23	23
September	25	25	26	27	31	31½	27	28½	31	32	23	23
October	23	25	26	27	27	30	27	29	28	31	23	23
November	23	24	27	28	27	30	28	29	28	31	22	23
December	23	24	27	29	29	30	29	30	30	31	22	23
Year	20	25	23½	29	25½	31½	23	30	26	32	19	23

Date.	Fine Territory, staple scoured.		Fine medium Territory, clothing scoured.		Texas, 12 months, scoured.		Fine fall, Texas scoured.		Pulled, A super, scoured.		Pulled, B super, scoured.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
1900	49	74	45	62	48	65	40	55	42	57	37	50
1901	43	50	35	44	43	50	36	42	35	45	30	38
1902	48	59	42	50	48	60	38	48	38	46	33	40
1903	52	60	50	58	48	60	44	48	40	47	39	44
1904	50	70	50	68	52	68	44	56	43	60	40	55
1905	65	78	60	72	63	76	54	63	55	65	52	60
1906	70	78	65	70	72	76	58	63	53	69	47	56
1907	70	75	66	73	70	75	50	62	45	60	38	52
1908	53	72	43	62	50	72	42	53	42	55	32	45
1909	62	80	60	72	60	78	45	62	47	65	38	58
1910	60	80	54	68	55	75	48	62	50	65	45	58
1911	53	62	51	60	46	60	41	50	45	55	41	47
1912	60	67	48	59	52	65	42	48	45	58	41	54
1913	51	67	46	59	50	65	41	50	42	58	36	54
1914.												
January	51	55	46	48	50	52	41	43	43	49	36	42
February	53	59	48	52	51	55	41	45	45	49	39	42
March	58	60	50	53	53	56	43	45	47	49	39	42
April	58	60	51	53	55	57	43	45	50	53	40	43
May	58	62	51	55	55	60	43	50	50	53	40	43
June	60	63	53	55	58	62	48	50	50	53	40	43
July	62	64	55	57	60	62	48	50	50	53	40	43
August	62	65	55	57	60	62	48	50	50	53	42	46
September	61	65	55	57	60	62	45	50	50	53	42	46
October	60	62	55	57	58	60	45	47	50	52	42	48
November	62	65	55	57	55	58	45	47	50	53	46	51
December	62	65	55	57	56	58	42	47	50	55	48	56
Year	51	65	46	57	50	62	41	50	43	55	36	56

[1] Quoted as X, washed, in 1900.

SHEEP AND WOOL—Continued.

Table 165.—*Wool: Wholesale price per pound, 1900–1914.*

Date.	Boston.		Philadelphia.		St. Louis.	
	Ohio XX, washed.		Ohio XX, washed.[1]		Best tub, washed.	
	Low.	High.	Low.	High.	Low.	High.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
1900	27	38	27	37	28	36
1901	26	28	25	28	24	29½
1902	27	32	26	32	24	29
1903	30	35	30	34	27	31
1904	32	36	31½	33½	30½	41
1905	34	37	34	36	37	43
1906	33½	36	33	35	31	40
1907	33	35	33	34	33	38
1908	30	35	30	34	22	33
1909	34	38	32	35	30	38
1910	30	38	30	35	31	37
1911	27	32	27	31	28	33
1912	28	33	25	31	27	38
1913	25	32	22	31	28	37
1914.						
January	25½	26½	22	23½	28	28
February	26½	26½	22½	24½	28	28
March	26½	27	24	25½	28	29
April	27	27	23½	25	29	29
May	27	28	24	24½	30	31
June	28	29	26	28	30	33
July	28	31	27	29	32	33
August	29	31	27	28½	32	33
September	31	31½	26½	28½	31	33
October	27	30	25	28½	31	32
November	27	30	26½	29	31	32
December	29	30	27	29	31	32
Year	25½	31½	22	29	28	33

[1] One-fourth to three-eighths unwashed, 1912–1914.

SHEEP AND WOOL—Continued.

TABLE 166.—*Wool: International trade, calendar years 1911–1913.*

["Wool" in this table includes: Washed, unwashed, scoured, and pulled wool; slipe, sheep's wool on skins (total weight of wool and skins taken); and all other animal fibers included in United States classification of wool. The following items have been considered as not within this classification: Corded, combed, and dyed wool; flocks, goatskins with hair on, mill waste, noils, and tops. See "General note," p. 518.]

EXPORTS.

[000 omitted.]

Country.	*1911*	*1912*	1913 (prelim.).	*Country.*	*1911*	*1912*	1913 (prelim.).
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
Algeria	17,156	11,635	11,635	New Zealand	175,982	195,030	193,338
Argentina	291,087	363,680	264,728	Persia [1]	10,005	9,438	9,438
Australia	*711,674*	*693,406*	*603,271*	Peru	*10,426*	*7,670*	*9,770*
Belgium	235,210	246,687	218,193	Russia	30,872	42,014	37,018
British India	60,253	53,686	51,031	Spain	24,757	24,987	32,358
British South Africa	*153,289*	*185,471*	*194,343*	Turkey [2]	24,084	24,084	24,084
Chile	23,905	27,360	28,418	United Kingdom	31,373	48,554	29,079
China	47,275	41,670	43,327	Uruguay	134,263	178,441	178,441
France	*81,842*	*88,990*	*79,650*	*Other countries*	*46,925*	*34,786*	*33,661*
Germany	35,581	49,743	47,774				
Netherlands	21,432	31,851	30,173	Total	2,167,481	2,359,279	2,120,630

IMPORTS.

Austria-Hungary	65,148	67,425	58,650	Russia	104,326	99,431	87,178
Belgium	340,040	345,758	329,074	Sweden	5,701	6,703	6,703
British India	22,469	26,066	29,116	Switzerland	11,635	11,295	10,444
Canada	6,877	8,836	8,587	United Kingdom	568,230	555,161	682,618
France	603,739	579,624	593,725	United States	155,923	238,118	130,183
Germany	468,712	517,120	481,571	Other countries	57,261	64,845	66,550
Japan	8,323	13,451	13,451				
Netherlands	29,376	37,681	38,419	Total	2,447,856	2,571,514	2,436,267

[1] Year beginning Mar. 21.
[2] Data for year beginning Mar. 14, 1910.

SWINE.

TABLE 167.—*Swine: Number and value on farms in the United States, 1867–1915.*

NOTE.—Figures in *italics* are census returns; figures in roman are estimates of the Department of Agriculture. Estimates of numbers are obtained by applying estimated percentages of increase or decrease to the published numbers of the preceding year, except that a revised base is used for applying percentage estimates whenever new census data are available. It should also be observed that the census of 1910, giving numbers as of Apr. 15, is not strictly comparable with former censuses, which related to numbers June 1.

Jan. 1—	Number.	Price per head.	Farm value.	Jan. 1—	Number.	Price per head.	Farm value.
867	24,694,000	$4.03	$99,637,000	1891	50,625,000	$4.15	$210,194,000
868	24,317,000	3.29	79,976,000	1892	52,398,000	4.60	241,031,000
869	23,316,000	4.65	108,431,000	1893	46,095,000	6.41	295,426,000
870	26,751,000	5.80	155,108,000	1894	45,206,000	5.98	270,385,000
870, census, June 1	*25,134,569*			1895	44,166,000	4.97	219,501,000
871	29,458,000	5.61	165,312,000	1896	42,843,000	4.35	186,530,000
872	31,796,000	4.01	127,453,000	1897	40,600,000	4.10	166,273,000
873	32,632,000	3.67	119,632,000	1898	39,760,000	4.39	174,351,000
874	30,861,000	3.98	122,695,000	1899	38,652,000	4.40	170,110,000
875	28,062,000	4.80	134,581,000	1900	37,079,000	5.00	185,472,000
876	25,727,000	6.00	154,251,000	*1900, census, June 1*	*62,868,041*		
877	28,077,000	5.66	158,873,000	1901 [1]	56,982,000	6.20	353,012,000
878	32,262,000	4.85	156,577,000	1902	48,699,000	7.03	342,121,000
879	34,766,000	3.18	110,508,000	1903	46,923,000	7.78	364,974,000
880	34,034,000	4.28	145,782,000	1904	47,009,000	6.15	289,225,000
880, census, June 1	*47,681,700*			1905	47,321,000	5.99	283,255,000
881	36,248,000	4.70	170,535,000	1906	52,103,000	6.18	321,803,000
882	44,122,000	5.97	263,543,000	1907	54,794,000	7.62	417,791,000
883	43,270,000	6.75	291,951,000	1908	56,084,000	6.05	339,030,000
884	44,201,000	5.57	246,301,000	1909	54,147,000	6.55	354,794,000
885	45,143,000	5.02	226,402,000	1910	47,782,000		
886	46,092,000	4.26	196,570,000	*1910, census, Apr. 1*	*58,185,676*	9.17	533,309,000
887	44,613,000	4.48	200,043,000	1911 [1]	65,620,000	9.37	615,170,000
888	44,347,000	4.98	220,811,000	1912	65,410,000	8.00	523,328,000
889	50,302,000	5.79	291,307,000	1913	61,178,000	9.86	603,109,000
890	51,603,000	4.72	243,418,000	1914	58,933,000	10.40	612,951,000
890, census, June 1	*57,409,583*			1915	64,618,000	9.87	637,479,000

[1] Estimates of numbers revised, based on census data.

SWINE—Continued.

TABLE 168.—*Swine: Number and value on farms Jan. 1, 1914 and 1915, by States.*

State.	Number (thousands) Jan. 1—		Average price per head Jan. 1—		Farm value (thousands of dollars) Jan. 1—	
	1915	1914	1915	1914	1915	1914
Maine	95	97	$15.70	$15.80	1,492	1,533
New Hampshire	52	51	14.00	14.80	728	755
Vermont	108	106	13.00	14.10	1,404	1,495
Massachusetts	*108*	*106*	*15.50*	*14.50*	*1,674*	*1,537*
Rhode Island	15	14	13.50	15.20	202	213
Connecticut	58	57	15.50	16.30	899	929
New York	768	753	14.30	14.50	10,982	10,918
New Jersey	161	158	14.00	13.60	2,254	2,149
Pennsylvania	1,186	1,130	13.50	13.80	16,011	15,594
Delaware	60	58	10.20	10.30	612	597
Maryland	349	332	9.70	10.50	3,385	3,486
Virginia	956	869	7.90	8.30	7,552	7,213
West Virginia	374	367	9.60	10.10	3,590	3,707
North Carolina	1,525	1,362	8.20	9.00	12,505	12,258
South Carolina	819	780	8.60	9.10	7,043	7,098
Georgia	2,042	1,945	8.00	8.20	16,336	15,949
Florida	*949*	*904*	*6.00*	*6.00*	*5,694*	*5,424*
Ohio	3,640	3,467	11.20	11.30	40,768	39,177
Indiana	4,167	3,969	10.30	10.30	42,920	40,881
Illinois	4,358	4,358	10.30	10.80	44,887	47,066
Michigan	1,392	1,313	10.90	12.30	15,173	16,150
Wisconsin	2,255	2,050	12.00	13.00	27,060	26,650
Minnesota	1,716	1,430	12.50	14.00	21,450	20,020
Iowa	*8,720*	*6,976*	*11.00*	*12.60*	*95,920*	*87,898*
Missouri	4,250	4,250	8.10	8.50	34,425	36,125
North Dakota	642	428	11.80	13.20	7,576	5,650
South Dakota	1,195	1,039	11.00	11.30	13,145	11,741
Nebraska	3,809	3,228	10.90	11.80	41,518	38,090
Kansas	2,656	2,350	10.10	10.00	26,826	23,500
Kentucky	1,582	1,507	7.20	7.70	11,390	11,604
Tennessee	1,501	1,390	7.80	8.50	11,708	11,815
Alabama	1,559	1,485	7.80	8.50	12,160	12,622
Mississippi	1,540	1,467	7.20	8.10	11,088	11,883
Louisiana	1,412	1,398	7.70	8.00	10,872	11,184
Texas	2,880	2,618	9.00	8.60	25,920	22,515
Oklahoma	1,420	1,352	8.20	8.40	11,644	11,357
Arkansas	1,573	1,498	6.50	7.40	10,224	11,085
Montana	276	184	10.80	11.90	2,981	2,190
Wyoming	64	51	11.40	12.40	730	632
Colorado	256	205	10.50	10.50	2,688	2,152
New Mexico	73	56	9.80	10.10	715	566
Arizona	31	24	12.00	9.60	372	230
Utah	98	85	10.20	10.90	1,000	926
Nevada	36	33	11.60	12.60	418	416
Idaho	328	252	10.00	10.70	3,280	2,696
Washington	327	284	11.10	12.70	3,630	3,607
Oregon	360	300	9.50	11.00	3,420	3,300
California	877	797	10.50	10.50	9,208	8,368
United States	64,618	58,933	9.87	10.40	637,479	612,951

SWINE—Continued.

TABLE 169.—*Hogs (live): Wholesale price per 100 pounds, 1900–1914.*

Date.	Cincinnati. Packing, fair to good.		St. Louis. Mixed packers.		Chicago.		Kansas City.		Omaha.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
1900	$4.45	$5.85	$4.40	$5.75	$3.35	$5.85	$4.40	$5.67½	$4.15	$5.62
1901	5.15	7.20	4.90	7.10	3.00	7.40	5.05	7.12½	4.45	6.85
1902	5.85	8.00	5.80	8.20	4.40	8.20	6.10	8.17½	5.25	8.05
1903	4.15	7.75	4.20	7.60	3.75	7.85	4.35	7.60	4.10	7.55
1904	4.35	6.25	4.25	6.30	3.60	6.37½	4.47½	6.07½	4.20	6.05
1905	4.60	6.35	4.75	6.35	3.90	6.45	4.55	6.25	4.30	6.10
1906	5.30	6.95	5.10	6.97	4.60	7.00	5.20	6.87½	4.85	6.75
1907	4.15	7.40	4.00	7.22	3.10	7.25	4.00	7.15	3.80	7.05
1908	4.15	7.35	4.20	7.35	3.95	7.60	4.00	7.15	3.97	6.90
1909	5.75	8.80	5.75	8.65	5.20	8.75	5.25	8.50	5.25	8.50
1910	6.95	11.10	6.80	11.05	6.50	11.20	6.90	10.90	7.26	10.85
1911	5.75	8.25	5.80	8.22	5.30	8.30	5.60	8.05	5.59	8.10
1912	6.10	9.35	5.75	9.25	5.55	9.40	5.65	9.05	7.00	9.00
1913	7.35	10.00	7.20	9.50	6.85	9.70	6.95	9.25	7.02	9.15
1914.										
January	8.10	8.75	7.65	8.65	7.75	8.60	7.55	8.50	7.50	8.45
February	8.50	9.05	8.00	9.00	8.15	8.90	8.00	8.75	7.50	8.60
March	8.65	9.10	8.00	9.00	8.20	9.00	8.15	8.80	7.75	8.70
April	8.60	9.15	8.25	9.00	7.90	8.95	8.15	8.80	8.15	8.72
May	8.05	8.70	8.00	8.70	7.60	8.67½	7.90	8.50	7.90	8.40
June	8.00	8.55	7.75	8.55	7.60	8.52½	7.75	8.45	7.75	8.32½
July	8.40	9.30	8.10	9.32½	7.85	9.27½	8.15	9.15	8.05	8.95
August	8.50	9.90	7.50	10.00	7.50	10.20	7.75	9.75	7.55	9.35
September	8.65	9.50	7.75	9.65	7.60	9.75	7.80	9.45	7.90	8.90
October	7.35	8.85	6.90	8.75	6.75	9.00	6.90	8.37½	6.70	8.25
November	6.60	8.25	7.00	7.65	6.70	8.25	6.90	8.10	6.90	8.05
December	6.40	7.10	6.80	7.40	6.00	7.75	6.65	7.40	6.50	7.25
Year	6.40	9.90	6.80	10.00	6.00	10.20	6.65	9.75	6.50	9.35

THE FEDERAL MEAT INSPECTION.

Some of the principal facts connected with the Federal meat inspection as administered by the Bureau of Animal Industry are shown in the following tables. The figures cover the annual totals for the fiscal years 1907 to 1914, inclusive, the former being the first year of operations under the meat-inspection law now in force. The data given comprise the number of establishments at which inspection is conducted; the number of animals of each species inspected at slaughter; the number of each species condemned, both wholly and in part, and the percentage condemned of each species and of all animals; the quantity of meat products prepared or processed under Federal supervision, and the quantity and percentage of the latter condemned.

Further details of the Federal meat inspection are published each year in the Annual Report of the Chief of the Bureau of Animal Industry.

TABLE 170.—*Number of establishments and total number of animals inspected at slaughter under Federal inspection annually, 1907 to 1914.*

Fiscal year.	Establishments.	Cattle.	Calves.	Swine.	Sheep.	Goats.	All animals.
1907	708	7,621,717	1,763,574	31,815,900	9,681,876	52,149	50,935,216
1908	787	7,116,275	1,995,487	35,113,077	9,702,545	45,953	53,973,337
1909	876	7,325,337	2,046,711	35,427,931	10,802,903	69,193	55,672,075
1910	919	7,962,189	2,295,099	27,656,021	11,149,937	115,811	49,179,057
1911	936	7,781,030	2,219,908	29,916,363	13,005,502	54,145	52,976,948
1912	940	7,532,005	2,242,929	34,966,378	14,208,724	63,983	59,014,019
1913	910	7,155,816	2,098,484	32,287,538	14,724,465	56,556	56,322,859
1914	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 171.—*Condemnations of animals at slaughter, 1907 to 1914.*

Fiscal year.	Cattle.			Calves.			Swine.		
	Whole.[1]	Part.	Per cent.[2]	Whole.[1]	Part.	Per cent.[2]	Whole.[1]	Part.	Per cent.[2]
1907	28,497	93,174	1.60	6,462	245	0.38	176,280	436,161	1.92
1908	34,960	67,482	1.44	5,858	396	.31	234,608	636,589	2.48
1909	37,544	90,739	1.87	8,217	409	.42	183,926	799,300	2.77
1910	45,588	122,167	2.11	7,531	500	.35	123,421	726,829	3.07
1911	42,578	123,969	2.14	7,656	781	.38	138,977	877,528	3.40
1912	54,778	134,783	2.52	8,945	1,212	.45	276,512	323,992	1.72
1913	56,736	130,139	2.61	9,267	1,377	.51	319,131	373,993	2.15
1914	54,417	138,085	2.86	6,733	1,234	.44	352,921	422,275	2.33

Fiscal year.	Sheep.			Goats.			All animals.		
	Whole.[1]	Part.	Per cent.[2]	Whole.[1]	Part.	Per cent.[2]	Whole.[1]	Part.	Per cent.[2]
1907	9,676	296	0.10	43	....	0.08	220,958	529,876	1.47
1908	8,186	198	.09	33	1	.07	283,645	704,666	1.83
1909	10,825	179	.10	82	1	.12	240,594	899,628	2.05
1910	11,156	24,714	.32	226	1	.19	187,922	874,211	2.16
1911	10,821	7,394	.14	61	....	.11	200,093	1,009,672	2.28
1912	16,304	3,871	.14	85	1	.13	356,624	463,859	1.39
1913	18,612	939	.13	78	1	.14	403,824	506,449	1.62
1914	21,402	1,564	.15	776	8	.64	436,249	563,166	1.76

[1] Includes carcasses passed for rendering into lard or tallow as well as those condemned outright.
[2] Includes both whole and parts; that is, the percentage given is of all carcasses the meat of which has been condemned in whole or in part.

TABLE 172.—*Quantity of meat and meat-food products prepared, and quantity and percentage condemned, under Federal supervision annually, 1907 to 1914.*

Fiscal year.	Prepared or processed	Condemned.	Per centage condemned
	Pounds.	*Pounds.*	
1907	4,464,213,208	14,874,587	0.33
1908	5,958,298,364	43,344,206	.73
1909	6,791,437,032	24,679,754	.36
1910	6,223,964,593	19,031,808	.31
1911	6,934,233,214	21,073,577	.31
1912	7,279,558,956	18,096,587	.25
1913	7,094,809,809	18,851,930	.27
1914	7,093,295,975	19,135,469	.27

AGRICULTURAL STATISTICS FROM CENSUS FOR 1910.

TABLE 173.—*Total population, total land area, farm area, improved, woodland, and other unimproved area, and their percentages by States.*

[Quantities expressed in thousands: 000 omitted.]

State and Division.	Total population.	Per cent rural.	Total land area.	Land in farms. Total	Land in farms. Improved.	Land in farms. Woodland.	Land in farms. Other unimproved.	Percentage of land area. In farms.	Percentage of land area. Improved.	Percentage of farm-land area. Improved.	Percentage of farm-land area. Woodland.	Percentage of farm-land area. Other unimproved.
	Number.		*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*					
Maine	742	48.6	19,133	6,297	2,361	2,776	1,161	32.9	12.3	37.5	44.1	18.4
New Hampshire	431	40.8	5,780	3,249	929	1,502	818	56.2	16.1	28.6	46.2	25.2
Vermont	356	52.5	5,839	4,664	1,634	1,567	1,463	79.9	28.0	35.0	33.6	31.4
Massachusetts	3,366	7.2	5,145	2,876	1,165	1,065	647	55.9	22.6	40.5	37.0	22.5
Rhode Island	543	3.3	683	443	178	186	79	64.9	26.1	40.2	42.0	17.8
Connecticut	1,115	10.3	3,085	2,186	988	758	440	70.9	32.0	45.2	34.7	20.1
New York	9,114	21.2	30,499	22,030	14,844	4,436	2,750	72.2	48.7	67.4	20.1	12.5
New Jersey	2,537	24.8	4,809	2,574	1,803	538	232	53.5	37.5	70.1	20.9	9.0
Pennsylvania	7,665	39.6	28,692	18,587	12,674	4,281	1,632	64.8	44.2	68.2	23.0	8.8
N. Atlantic	25,869	25.9	103,665	62,906	36,576	17,109	9,222	60.7	35.3	58.2	27.1	14.7
Delaware	202	52.0	1,258	1,039	714	252	73	82.6	56.7	68.7	24.3	7.0
Dist. of Columbia	331	......	38	6	5	1	0	15.8	13.4	84.7	11.3	4.0
Maryland	1,295	49.2	6,362	5,057	3,355	1,467	235	79.5	52.7	66.3	29.0	4.7
Virginia	2,062	76.9	25,768	19,496	9,870	8,415	1,211	75.7	38.3	50.6	43.2	6.2
West Virginia	1,221	81.3	15,374	10,026	5,522	3,969	536	65.2	35.9	55.1	39.6	5.3
North Carolina	2,206	85.6	31,194	22,439	8,813	12,452	1,174	71.9	28.3	39.3	55.5	5.2
South Carolina	1,515	85.2	19,517	13,512	6,098	6,339	1,075	69.2	31.2	45.1	46.9	8.0
Georgia	2,609	79.4	37,584	26,953	12,298	13,003	1,653	71.7	32.7	45.6	48.3	6.1
Florida	753	70.9	35,111	5,254	1,805	3,008	440	15.0	5.1	34.4	57.2	8.4
S. Atlantic	12,195	74.6	172,205	103,782	48,480	48,905	6,398	60.3	28.2	46.7	47.1	6.2
Ohio	4,767	44.1	26,074	24,106	19,228	3,285	1,592	92.5	73.7	79.8	13.6	6.6
Indiana	2,701	57.6	23,069	21,300	16,931	3,371	998	92.3	74.7	79.5	15.8	4.7
Illinois	5,639	38.3	35,868	32,523	28,048	3,148	1,327	90.7	78.2	86.2	9.7	4.1
Michigan	2,810	52.8	36,787	18,941	12,832	2,928	3,181	51.5	34.9	67.8	15.4	16.8
Wisconsin	2,334	57.0	35,364	21,060	11,908	5,378	3,775	59.6	33.7	56.5	25.6	17.9
N. C. E. Miss. R.	18,251	47.3	157,162	117,929	88,947	18,109	10,873	75.0	56.6	75.4	15.4	9.2
Minnesota	2,076	59.0	51,749	27,676	19,644	3,922	4,110	53.5	38.0	71.0	14.1	14.9
Iowa	2,225	69.4	35,575	33,931	29,491	2,814	2,125	95.4	82.9	86.9	6.8	6.3
Missouri	3,293	57.5	43,985	34,591	24,581	8,919	1,091	78.6	55.9	71.1	25.8	3.1
North Dakota	577	89.0	44,917	28,427	20,455	422	7,550	63.3	45.5	72.0	1.5	26.5
South Dakota	584	86.9	49,196	26,017	15,827	383	9,807	52.9	32.2	60.8	1.5	37.7
Nebraska	1,192	73.9	49,157	38,622	24,383	803	13,436	78.6	49.6	63.1	2.1	34.8
Kansas	1,691	70.8	52,335	43,385	29,904	1,206	12,275	82.9	57.1	68.9	2.8	28.3
N. C. W. Miss. R.	11,638	66.7	326,914	232,648	164,285	17,970	50,394	71.1	50.3	70.6	7.7	21.7
Kentucky	2,290	75.7	25,716	22,189	14,354	6,952	883	86.3	55.8	64.7	31.3	4.0
Tennessee	2,185	79.8	26,680	20,042	10,890	8,008	1,143	75.1	40.8	54.3	40.0	5.7
Alabama	2,138	82.7	32,819	20,732	9,694	9,445	1,594	63.2	29.5	46.8	45.6	7.6
Mississippi	1,797	88.5	29,672	18,558	9,008	7,884	1,666	62.5	30.4	48.5	42.5	9.0
Louisiana	1,656	70.0	29,062	10,439	5,276	4,317	847	35.9	18.2	50.5	41.4	8.1
Texas	3,897	75.9	167,935	112,435	27,361	27,658	57,416	67.0	16.3	24.3	24.6	51.1
Oklahoma	1,657	80.7	44,425	28,859	17,551	3,569	7,739	65.0	39.5	60.8	12.4	26.8
Arkansas	1,574	87.1	33,616	17,416	8,076	8,512	828	51.8	24.0	46.4	48.8	4.7
S. Central	17,194	79.5	389,925	250,671	102,211	76,343	72,116	64.3	26.2	40.8	30.4	28.8
Montana	376	64.5	93,509	13,546	3,640	596	9,309	14.5	3.9	26.9	4.4	68.7
Wyoming	146	70.4	62,460	8,543	1,256	252	7,036	13.7	2.0	14.7	2.9	82.4
Colorado	799	49.3	66,341	13,532	4,302	892	8,339	20.4	6.5	31.8	6.5	61.7
New Mexico	327	85.8	78,402	11,270	1,467	1,491	8,312	14.4	1.9	13.0	13.2	73.8
Arizona	204	69.0	72,838	1,247	350	100	796	1.7	.5	28.1	8.0	63.9
Utah	373	53.7	52,598	3,398	1,368	146	1,884	6.5	2.6	40.3	4.3	55.4
Nevada	82	83.7	70,285	2,715	752	48	1,914	3.9	1.1	27.7	1.7	70.6
Idaho	326	78.5	53,347	5,284	2,779	585	1,920	9.9	5.2	52.6	11.1	36.3
Washington	1,142	47.0	42,775	11,712	6,373	1,542	3,797	27.4	14.9	54.4	13.2	32.4
Oregon	673	54.4	61,188	11,685	4,275	2,238	5,172	19.1	7.0	36.6	19.1	44.3
California	2,378	38.2	99,617	27,931	11,390	4,542	12,000	28.0	11.4	40.8	16.2	43.0
Far Western	6,826	51.2	753,420	110,952	37,953	12,430	60,479	14.7	5.0	34.2	11.2	54.6
United States	91,972	53.5	1,903,290	878,798	478,452	190,866	209,481	46.2	25.2	54.5	21.7	23.8

TABLE 174.—*Total value of all farm property, land, buildings, implements and machinery, animals, poultry and bees, with percentages, by States.*

[Quantities given in thousands; 000 omitted.]

State and Division.	Value of all farm property.		Value of land.		Value of buildings.		Value of implements and machinery.		Value of animals, poultry and bees.	
	Total.	Per cent of 1900.	Total.	Per cent of 1900.	Total.	Per cent of 1900.	Total.	Per cent of 1900.	Total.	Per cent of 1900.
Maine	$199,272	162.8	$86,481	175.2	$73,138	155.1	$14,490	164.6	$25,162	147.1
N. H.	103,704	120.8	44,519	125.4	41,397	119.6	5,878	113.8	11,910	112.8
Vermont	145,400	134.1	58,385	127.4	54,203	145.5	10,169	134.9	22,643	126.9
Mass	226,474	124.0	105,533	121.4	88,636	124.7	11,564	131.0	20,741	131.3
R. I.	32,991	122.2	15,010	111.8	12,923	133.2	1,781	140.2	3,276	126.3
Connecticut	159,400	140.7	72,206	137.7	66,113	147.0	6,917	139.8	14,164	129.6
New York	1,451,481	135.7	707,748	128.4	476,998	141.6	83,645	149.3	183,091	145.8
New Jersey	254,833	134.5	124,143	133.0	92,991	134.3	13,109	140.5	24,589	139.6
Pa	1,253,275	119.2	630,430	109.6	410,639	127.2	70,726	138.9	141,480	138.1
N. Atlantic	3,826,830	129.7	1,844,455	122.7	1,317,038	135.2	218,279	142.8	447,056	139.5
Delaware	63,179	155.2	34,938	147.0	18,218	170.8	3,206	149.1	6,817	165.8
Dist. of Col.	8,476	73.5	7,194	74.2	1,037	65.9	92	67.9	153	122.0
Maryland	286,167	139.8	163,452	135.8	78,286	142.8	11,860	137.7	32,570	156.2
Virginia	625,065	193.2	394,659	196.7	137,399	193.6	18,116	182.6	74,891	178.2
W. Va.	314,739	154.4	207,076	154.2	57,315	168.4	7,011	139.1	43,336	141.8
N. C.	537,716	230.0	343,165	241.7	113,460	215.3	18,442	203.3	62,650	208.1
S. C.	392,128	255.3	268,775	269.3	64,113	237.8	14,109	212.8	45,131	223.4
Georgia	580,546	254.2	370,353	267.4	108,851	242.7	20,948	213.7	80,394	228.4
Florida	143,183	265.5	93,738	304.1	24,408	244.6	4,446	226.5	20,591	184.4
S. Atlantic	2,951,201	203.0	1,883,350	209.3	603,087	196.7	98,230	184.2	366,533	188.6
Ohio	1,902,695	158.7	1,285,895	157.4	368,258	167.8	51,210	140.9	197,332	156.7
Indiana	1,809,135	184.9	1,328,197	193.2	266,079	172.7	41,000	150.0	173,860	158.7
Illinois	3,905,321	194.8	3,090,411	204.1	432,381	171.9	73,724	163.9	308,805	159.4
Michigan	1,088,858	157.7	615,258	145.3	285,880	179.9	49,916	173.3	137,804	174.3
Wisconsin	1,413,119	174.1	911,938	171.9	289,694	186.2	52,957	181.1	158,529	164.6
N. C. E. of Miss. R.	10,119,128	178.0	7,231,699	182.0	1,642,292	174.8	268,807	161.3	976,330	161.5
Minnesota	1,476,412	187.2	1,019,102	182.2	243,339	220.8	52,329	173.9	161,641	181.5
Iowa	3,745,861	204.2	2,801,974	223.0	455,406	189.1	95,478	164.7	393,003	140.9
Missouri	2,052,917	198.7	1,445,982	207.9	270,222	182.0	50,874	177.9	285,839	178.0
N. Dak.	974,814	381.9	730,380	421.3	92,277	362.9	43,908	312.4	108,250	255.1
S. Dak.	1,166,097	391.9	902,607	477.1	102,474	331.3	33,787	276.5	127,229	195.2
Nebraska	2,079,819	278.1	1,614,539	331.8	198,808	218.3	44,250	177.4	222,222	152.9
Kansas	2,039,390	236.0	1,537,977	289.0	199,580	179.1	48,310	163.8	253,524	132.8
N. C. W. of Miss. R.	13,535,310	238.1	10,052,561	258.2	1,562,106	206.0	368,936	186.9	1,551,708	159.6
Kentucky	773,798	164.3	484,465	166.4	150,995	166.1	20,852	136.3	117,487	159.3
Tennessee	612,521	179.5	371,416	183.9	109,107	172.8	21,292	139.8	110,706	182.0
Alabama	370,138	206.3	216,944	216.6	71,309	207.0	16,290	187.8	65,595	181.7
Mississippi	426,315	208.8	254,002	221.1	80,160	215.8	16,905	176.9	75,247	176.4
Louisiana	301,221	151.7	187,803	174.3	49,741	148.9	18,977	88.5	44,699	154.8
Texas	2,218,645	230.5	1,633,207	276.1	210,001	209.5	56,790	188.5	318,647	132.5
Oklahoma	918,199	330.9	649,067	434.5	89,611	418.6	27,089	257.7	152,433	158.4
Arkansas	400,089	220.5	246,022	234.1	63,145	210.0	16,864	192.7	74,058	197.6
S. Central	6,020,926	213.8	4,042,926	243.3	824,069	200.6	195,059	154.0	958,872	155.5
Montana	347,829	295.1	226,771	430.6	24,855	265.4	10,540	287.0	85,663	164.2
Wyoming	167,189	247.8	88,908	379.4	9,007	255.0	3,668	268.5	65,606	167.6
Colorado	491,472	305.2	362,822	401.6	45,697	285.8	12,792	269.5	70,161	149.5
New Mexico	159,448	296.6	98,807	570.4	13,024	365.3	4,122	358.0	43,495	157.1
Arizona	75,124	250.5	42,350	371.0	4,936	217.8	1,788	233.6	26,051	167.6
Utah	150,795	200.6	99,482	247.9	18,063	169.6	4,468	152.9	28,782	134.0
Nevada	60,399	210.6	35,277	265.7	4,333	185.2	1,576	177.4	19,214	157.9
Idaho	305,317	453.9	219,953	619.8	25,113	367.6	10,476	317.9	49,775	229.8
Washington	637,543	442.6	517,422	521.0	54,546	334.6	16,710	266.4	48,865	230.5
Oregon	528,244	205.8	411,696	363.9	43,880	228.5	13,206	203.0	59,462	175.3
California	1,614,696	202.7	1,317,195	206.9	133,406	172.2	36,498	171.2	127,600	180.6
Far Western	[illegible]	264.7	3,420,683	368.5	376,860	225.0	115,830	218.0	624,674	170.1
U. S.	40,991,450	200.5	28,475,674	218.1	6,325,452	177.8	1,265,150	168.7	4,925,173	160.1

TABLE 175.—*Total number of farms, average acreage per farm, value of property, value of land per acre, and total value of all crops.*

State and Division.	Total number of farms.	Average acreage per farm.	Average acreage of improved land per farm.	Average value per farm of—		Average value of land per acre—		Value of all crops.
				All property.	Lands and buildings only.	1910	1900	1909
	Number.	*Acres.*	*Acres.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*
Maine	60,016	104.9	39.3	3,320	2,660	13.73	7.83	39,317,647
New Hampshire	27,053	120.1	34.3	3,833	3,176	13.70	9.83	15,976,175
Vermont	32,709	142.6	50.0	4,445	3,442	12.52	9.70	27,446,836
Massachusetts	36,917	77.9	31.5	6,135	5,260	36.69	27.62	31,948,095
Rhode Island	5,292	83.8	33.7	6,234	5,278	33.86	29.46	3,937,077
Connecticut	26,815	81.5	36.9	5,944	5,158	33.03	22.68	22,487,999
New York	215,597	102.2	68.8	6,732	5,495	32.13	24.34	209,168,236
New Jersey	33,487	76.9	53.9	7,610	6,484	48.23	32.86	40,340,491
Pennsylvania	219,295	84.8	57.8	5,715	4,747	33.92	29.70	166,739,898
N. Atlantic	657,181	95.7	55.7	5,823	4,811	29.32	22.98	557,362,454
Delaware	10,836	95.9	65.8	5,830	4,905	33.63	22.29	9,121,809
District of Columbia	217	27.9	23.7	39,062	37,932	1,186.53	1,142.68	546,479
Maryland	48,923	103.4	68.6	5,849	4,941	32.32	23.28	43,920,149
Virginia	184,018	105.9	53.6	3,397	2,891	20.24	10.08	100,531,157
West Virginia	96,685	103.7	57.1	3,255	2,735	20.65	12.60	40,374,776
North Carolina	253,725	88.4	34.7	2,119	1,800	15.29	6.24	142,890,192
South Carolina	176,434	76.6	34.6	2,223	1,887	19.89	7.14	141,983,354
Georgia	291,027	92.6	42.3	1,995	1,647	13.74	5.25	226,595,436
Florida	50,016	105.0	36.1	2,863	2,362	17.84	7.06	36,141,894
S. Atlantic	1,111,881	93.4	43.6	2,654	2,236	18.15	8.63	742,105,246
Ohio	272,045	88.6	70.7	6,994	6,080	53.34	33.35	230,337,981
Indiana	215,485	98.8	78.6	8,396	7,399	62.36	31.81	204,209,812
Illinois	251,872	129.1	111.4	15,505	13,986	95.02	46.17	372,270,470
Michigan	206,960	91.5	62.0	5,261	4,354	32.48	24.12	162,004,081
Wisconsin	177,127	119.0	67.0	7,978	6,784	43.30	26.71	148,359,216
N. C. E. Miss. R.	1,123,489	105.0	79.2	9,007	7,899	61.32	34.15	1,117,182,160
Minnesota	156,137	177.3	125.8	9,456	8,085	36.82	21.31	193,451,474
Iowa	217,044	156.3	135.9	17,259	15,008	82.58	36.35	314,666,298
Missouri	277,244	124.8	88.7	7,495	6,180	41.80	20.46	229,883,724
North Dakota	74,360	382.3	275.1	13,109	11,063	25.69	11.15	180,635,520
South Dakota	77,644	335.1	203.8	15,018	12,945	34.69	9.92	125,507,249
Nebraska	129,678	297.8	188.0	16,038	13,983	41.80	16.27	196,125,632
Kansas	177,841	244.0	168.2	11,467	9,770	35.45	12.77	214,859,597
N. C. W. Miss. R.	1,109,948	209.6	148.0	12,195	10,464	43.21	19.37	1,445,909,494
Kentucky	259,185	85.6	55.4	2,986	2,452	21.83	13.24	138,973,107
Tennessee	246,012	81.5	44.3	2,490	1,953	18.53	9.93	120,706,211
Alabama	262,901	78.9	36.9	1,408	1,096	10.46	4.84	144,287,347
Mississippi	274,382	67.6	32.8	1,554	1,218	13.69	6.30	147,315,621
Louisiana	120,546	86.6	43.8	2,499	1,971	17.99	9.74	77,336,143
Texas	417,770	269.1	65.5	5,311	4,412	14.53	4.70	298,133,466
Oklahoma	190,192	151.7	92.3	4,828	3,884	22.49	6.50	133,454,405
Arkansas	214,678	81.1	37.6	1,864	1,440	14.13	6.32	119,419,025
South Central	1,985,666	126.2	51.5	3,032	2,451	16.13	6.45	1,179,625,325
Montana	26,214	516.7	138.9	13,269	9,599	16.74	4.45	29,714,563
Wyoming	10,987	777.6	114.3	15,217	8,912	10.41	2.88	10,022,961
Colorado	46,170	293.1	93.2	10,645	8,848	26.81	9.54	50,974,958
New Mexico	35,676	315.9	41.1	4,469	3,135	8.77	3.38	8,922,397
Arizona	9,227	135.1	38.0	8,142	5,125	33.97	5.90	5,496,872
Utah	21,676	156.7	63.1	6,957	5,423	29.28	9.75	18,484,615
Nevada	2,689	1,009.6	279.7	22,462	14,730	12.99	5.17	5,923,536
Idaho	30,807	171.5	90.2	9,911	7,955	41.63	11.07	34,357,851
Washington	56,192	208.4	113.4	11,346	10,179	44.18	11.68	78,927,053
Oregon	45,502	256.8	93.9	11,609	10,012	35.23	11.23	49,040,725
California	88,197	316.7	129.1	18,308	16,447	47.16	21.87	153,111,013
Far Western	373,337	296.9	101.7	12,155	10,172	30.86	12.01	444,976,544
United States	6,361,502	138.1	75.2	6,444	5,471	32.40	15.57	5,487,161,223

Table 176.—*Estimated value of farm products.*

[Based on prices at the farm.]

Year.	Total, gross.	Crops.		Animals and animal products.	
		Value.	Percentage of total.	Value.	Percentage of total.
1879 (census)	$2,212,540,927				
1889 (census)	2,460,107,454				
1897	3,960,821,685	$2,519,082,592	63.6	$1,441,739,093	36.4
1898	4,338,945,829	2,759,569,547	63.6	1,579,376,282	36.4
1899 (census)	4,717,069,973	2,998,704,412	63.6	1,718,365,561	36.4
1900	5,009,595,006	3,191,941,763	63.7	1,817,653,243	36.3
1901	5,302,120,039	3,385,179,114	63.8	1,916,940,925	36.2
1902	5,594,645,072	3,578,416,465	64.0	2,016,228,607	36.0
1903	5,887,170,104	3,771,653,816	64.1	2,115,516,288	35.9
1904	6,121,778,001	3,981,675,866	65.0	2,140,102,135	35.0
1905	6,273,997,362	4,012,652,758	64.0	2,261,344,604	36.0
1906	6,764,210,423	4,263,134,353	63.0	2,501,076,070	37.0
1907	7,487,988,622	4,761,111,839	63.6	2,726,876,783	36.4
1908	7,890,625,522	5,098,292,549	64.6	2,792,332,973	35.4
1909 (census)	8,498,311,413	5,487,161,223	64.6	3,011,150,190	35.4
1910	9,037,390,744	5,486,373,550	60.7	3,551,017,194	39.3
1911	8,819,174,959	5,562,058,150	63.1	3,257,116,809	36.9
1912	9,342,790,149	5,842,220,449	62.5	3,500,569,700	37.5
1913	9,789,625,000	6,132,759,000	62.6	3,656,865,766	37.4
1914	9,872,936,000	6,044,480,000	61.2	3,828,456,000	38.8

Table 177.—*Value of crops and animal products in the United States in 1909, by geographic divisions, according to the census.*

[In thousands of dollars.]

Geographic division.	Crops.	Animal products.						
		Dairy products.	Wool and mohair.	Eggs produced.	Fowls raised.	Honey and wax.	Animals sold and slaughtered.	Total animal products.
New England	141,114	50,721	576	15,156	7,361	109	30,417	104,340
Middle Atlantic	416,249	130,772	2,495	37,507	21,527	675	89,563	282,539
East North Central	1,117,182	159,674	14,287	75,238	47,973	973	422,926	721,071
West North Central	1,445,909	108,824	6,154	77,493	52,337	864	715,336	961,008
South Atlantic	742,105	35,578	1,962	26,546	24,414	926	102,509	191,935
East South Central	551,282	30,201	1,652	22,283	19,129	550	129,996	203,811
West South Central	628,343	32,394	2,915	26,396	17,681	494	181,003	260,883
Mountain	163,898	12,992	29,396	8,583	4,373	575	100,115	156,034
Pacific	281,079	35,257	6,937	17,487	7,711	826	61,310	129,528
United States	5,487,161	596,413	66,374	306,689	202,506	5,992	1,833,175	3,011,149

TABLE 178.—*Crop production and States leading in production of each crop: 1909. (From Thirteenth Census report.)*

[The figures opposite the name of each crop are for the United States as a whole.]

Crop and State.	Acreage.	Production.	Unit.	Value.	Per cent of United States total.		
					Acreage.	Production.	Value.
Almonds		6,793,539	Lbs.	$711,970		100.0	100.0
California		6,692,513	Lbs.	700,304		98.5	98.4
Apples		147,522,318	Bu.	83,231,492		100.0	100.0
New York		25,409,324	Bu.	13,343,028		17.2	16.0
Michigan		12,332,296	Bu.	5,969,080		8.4	7.2
Pennsylvania		11,048,430	Bu.	5,557,616		7.5	6.7
Missouri		9,968,977	Bu.	4,885,544		6.8	5.9
Apricots		4,150,263	Bu.	2,884,119		100.0	100.0
California		4,066,823	Bu.	2,768,921		98.0	96.0
Avocado pears							
Florida		4,920	Crates.	10,100		100.0	100.0
Bananas		10,060	(1)	5,661		100.0	100.0
Florida		10,048	(1)	5,638		99.9	99.6
Barley	7,698,706	173,344,212	Bu.	92,458,571	100.0	100.0	100.0
Minnesota	1,573,761	34,927,773	Bu.	17,213,817	20.4	20.1	18.6
California	1,195,158	26,441,954	Bu.	17,184,508	15.5	15.3	18.6
Wisconsin	816,449	22,156,041	Bu.	12,682,136	10.6	12.8	13.7
North Dakota	1,215,811	26,365,758	Bu.	11,962,036	15.8	15.2	12.9
South Dakota	1,114,531	22,396,130	Bu.	10,873,522	14.5	12.9	11.8
Iowa	571,224	10,964,184	Bu.	5,320,708	7.4	6.3	5.8
Beans (dry, edible)	802,991	11,251,160	Bu.	21,771,482	100.0	100.0	100.0
Michigan	403,609	5,282,511	Bu.	9,716,315	50.3	47.0	44.6
California	157,987	3,328,218	Bu.	6,295,457	19.7	29.6	28.9
New York	115,698	1,681,506	Bu.	3,689,064	14.4	14.9	16.9
Beets (sugar)	364,093	3,932,857	Tons.	19,880,724	100.0	100.0	100.0
Colorado	108,082	1,231,712	Tons.	6,061,152	29.7	31.3	30.5
California	78,957	845,191	Tons.	4,320,532	21.7	21.5	21.7
Michigan	78,779	707,639	Tons.	4,014,123	21.6	18.0	20.2
Utah	27,472	413,946	Tons.	1,858,600	7.5	10.5	9.3
Blackberries and dewberries	49,004	55,343,570	Qts.	3,909,831	100.0	100.0	100.0
Missouri	5,975	6,391,209	Qts.	456,283	12.2	11.5	11.7
New Jersey	4,332	5,456,789	Qts.	313,480	8.8	9.9	8.0
California	2,576	4,898,524	Qts.	282,383	5.3	8.9	7.2
Illinois	3,503	2,915,473	Qts.	237,058	7.1	5.3	6.1
Michigan	2,973	3,075,954	Qts.	218,174	6.1	5.6	5.6
Broom corn	326,102	78,959,958	Lbs.	5,134,434	100.0	100.0	100.0
Oklahoma	216,350	42,741,725	Lbs.	2,559,235	66.3	54.1	49.8
Illinois	38,452	19,309,425	Lbs.	1,457,172	11.8	24.5	28.4
Kansas	41,064	8,768,853	Lbs.	593,947	12.6	11.1	11.6
Buckwheat	878,048	14,849,332	Bu.	9,330,592	100.0	100.0	100.0
New York	286,276	5,691,745	Bu.	3,587,558	32.6	38.3	38.4
Pennsylvania	292,728	4,797,350	Bu.	2,895,958	33.3	32.3	31.0
Michigan	75,909	958,119	Bu.	594,748	8.6	6.5	6.4
Cherries		4,126,099	Bu.	7,231,160		100.0	100.0
California		501,013	Bu.	951,624		12.1	13.2
Pennsylvania		475,093	Bu.	909,975		11.5	12.6
Ohio		338,644	Bu.	657,406		8.2	9.1
Michigan		338,945	Bu.	590,829		8.2	8.2
New York		271,597	Bu.	544,508		6.6	7.5
Indiana		363,993	Bu.	508,516		8.8	7.0
Iowa		260,432	Bu.	455,022		6.3	6.3
Illinois		287,376	Bu.	453,474		7.0	6.3
Chicory	1,589	19,284,000	Lbs.	70,460	100.0	100.0	100.0
Michigan	1,584	19,204,000	Lbs.	70,020	99.7	99.6	99.4
Chufas	1,712	32,261	Bu.	62,391	100.0	100.0	100.0
Florida	1,072	21,500	Bu.	43,470	62.6	66.6	69.7
North Carolina	376	6,880	Bu.	10,529	22.0	21.3	16.9
Corn	98,382,665	2,552,189,630	Bu.	1,438,553,919	100.0	100.0	100.0
Illinois	10,045,839	390,218,676	Bu.	198,350,496	10.2	15.3	13.8
Iowa	9,229,378	341,750,460	Bu.	167,622,834	9.4	13.4	11.7
Missouri	7,113,953	191,427,087	Bu.	107,347,033	7.2	7.5	7.5
Indiana	4,901,054	195,496,433	Bu.	98,437,988	5.0	7.7	6.8
Nebraska	7,266,067	180,132,807	Bu.	88,234,846	7.4	7.1	6.1
Ohio	3,916,050	157,513,300	Bu.	82,327,269	4.0	6.2	5.7
Kansas	8,109,061	154,651,703	Bu.	80,750,803	8.2	6.1	5.6
Cotton	32,043,838	10,649,268	Bales.	703,619,303	100.0	100.0	100.0
Texas	9,930,179	2,455,174	Bales.	162,735,041	31.0	23.1	23.1
Georgia	4,883,304	1,992,408	Bales.	126,695,612	15.2	18.7	18.0
Mississippi	3,400,210	1,127,156	Bales.	83,148,805	10.6	10.6	11.8
South Carolina	2,556,467	1,277,866	Bales.	80,337,945	8.0	12.0	11.4
Alabama	3,730,482	1,129,527	Bales.	74,205,236	11.6	10.6	10.5
Arkansas	2,153,222	776,879	Bales.	54,559,503	6.7	7.3	7.8
North Carolina	1,274,404	665,132	Bales.	42,066,099	4.0	6.2	6.0

TABLE 178.—*Crop production and States leading in production of each crop: 1909. (From Thirteenth Census report)*—Continued.

[The figures opposite the name of each crop are for the United States as a whole.]

Crop and State.	Acreage.	Production.	Unit.	Value.	Per cent of United States total. Acreage.	Production.	Value.
Cottonseed (estimated)		5,324,634	Tons.	$121,076,984		100.0	100.0
Texas		1,227,587	Tons.	25,938,913		23.1	21.4
Georgia		996,204	Tons.	23,241,446		18.7	19.2
South Carolina		639,933	Tons.	16,043,122		12.0	13.3
Mississippi		563,578	Tons.	13,204,628		10.6	10.9
Alabama		564,764	Tons.	12,803,196		10.6	10.6
Arkansas		388,440	Tons.	8,596,180		7.3	7.1
North Carolina		332,566	Tons.	8,417,246		6.2	7.0
Oklahoma		277,871	Tons.	5,788,052		5.2	4.8
Cranberries	18,431	38,243,060	Qts.	1,755,613	100.0	100.0	100.0
Massachusetts	6,577	22,714,496	Qts.	1,062,205	35.7	59.4	60.5
New Jersey	9,030	12,072,288	Qts.	504,026	49.0	31.6	28.7
Wisconsin	1,689	2,549,344	Qts.	127,212	9.2	6.7	7.2
Currants	7,862	10,448,532	Qts.	790,431	100.0	100.0	100.0
New York	2,557	3,982,389	Qts.	264,051	32.5	38.1	33.4
Michigan	609	768,259	Qts.	58,288	7.7	7.4	7.4
California	407	852,378	Qts.	43,508	5.2	8.2	5.5
Dates		9,947	Lbs.	533		100.0	100.0
California		3,332	Lbs.	418		33.5	78.4
Arizona		6,500	Lbs.	96		65.3	18.0
Emmer and spelt	573,622	12,702,710	Bu.	5,584,050	100.0	100.0	100.0
South Dakota	259,611	6,098,982	Bu.	2,627,533	45.3	48.0	47.1
North Dakota	101,144	2,564,732	Bu.	1,102,782	17.6	20.2	19.7
Nebraska	65,681	1,221,975	Bu.	484,791	11.5	9.6	8.7
Kansas	49,969	785,362	Bu.	342,846	8.7	6.2	6.1
Minnesota	30,891	757,339	Bu.	338,841	5.4	6.0	6.1
Figs		35,060,395	Lbs.	803,810		100.0	100.0
California		22,990,353	Lbs.	260,153		65.6	32.4
Mississippi		1,949,301	Lbs.	107,609		5.6	13.4
Texas		2,411,876	Lbs.	97,078		6.9	12.1
Louisiana		2,025,308	Lbs.	87,009		5.8	10.8
Alabama		1,773,126	Lbs.	80,960		5.1	10.1
Flaxseed	2,083,142	19,512,765	Bu.	28,970,554	100.0	100.0	100.0
North Dakota	1,068,049	10,245,684	Bu.	15,488,016	51.3	52.5	53.5
South Dakota	518,566	4,759,794	Bu.	7,001,717	24.9	24.4	24.2
Minnesota	358,426	3,277,238	Bu.	4,863,328	17.2	16.8	16.8
Flowers and plants	18,248			34,872,329	100.0		100.0
New York	2,979			5,148,949	16.3		14.8
Pennsylvania	2,032			3,803,418	11.1		10.9
Illinois	1,339			3,694,801	7.3		10.6
New Jersey	1,436			2,857,709	7.9		8.2
Massachusetts	1,203			2,455,467	6.6		7.0
Ohio	1,070			2,384,890	5.9		6.8
Forest products				195,306,283			100.0
North Carolina				11,364,134			5.8
New York				10,365,651			5.3
Virginia				10,118,851			5.2
Wisconsin				9,559,428			4.9
Ginseng	23			151,888	100.0		100.0
New York	(1)			27,138			17.9
Wisconsin	16			25,977	69.6		17.1
Missouri	(1)			21,868			14.4
Ohio	(1)			16,639			11.0
Pennsylvania	(1)			15,291			10.1
Michigan	(1)			13,794			9.1
Gooseberries	4,765	5,282,843	Qts.	417,034	100.0	100.0	100.0
Illinois	603	541,498	Qts.	44,238	12.7	10.3	10.6
Missouri	555	470,029	Qts.	39,941	11.6	8.9	9.6
Michigan	297	403,680	Qts.	28,932	6.2	7.6	6.9
Indiana	274	320,963	Qts.	25,682	5.8	6.1	6.2
New York	259	331,135	Qts.	23,427	5.4	6.3	5.6
Oregon	186	307,395	Qts.	20,893	3.9	5.8	5.0
Maryland	241	300,321	Qts.	18,000	5.1	5.7	4.3
Grapefruit (pomaloes)		1,189,250	Boxes.	2,060,610		100.0	100.0
Florida		1,061,537	Boxes.	1,907,816		89.3	92.6
California		122,515	Boxes.	143,180		10.3	6.9
Grapes		2,571,065,205	Lbs.	22,027,961		100.0	100.0
California		1,970,686,525	Lbs.	10,846,812		77.0	49.2
New York		253,006,361	Lbs.	3,961,677		9.8	18.0
Guavas		354,062	Lbs.	11,628		100.0	100.0
Florida		258,709	Lbs.	7,604		73.1	65.4
California		[illegible]	Lbs.	[illegible]		[illegible]	[illegible]

TABLE 178.—*Crop production and States leading in production of each crop: 1909. (From Thirteenth Census report)*—Continued.

[The figures opposite the name of each crop are for the United States as a whole.]

Crop and State.	Acreage.	Production.	Unit.	Value.	Per cent of United States total. Acreage.	Production.	Value.
Hay and forage	72,280,776	97,453,735	Tons.	$824,004,877	100.0	100.0	100.0
New York	5,043,373	7,055,429	Tons.	77,360,645	7.0	7.2	9.4
Iowa	5,046,185	7,823,181	Tons.	59,360,225	7.0	8.0	7.2
Wisconsin	3,079,102	5,002,644	Tons.	40,866,396	4.3	5.1	5.0
Kansas	3,957,745	5,936,997	Tons.	32,033,954	5.5	6.1	3.9
Nebraska	4,520,034	5,776,475	Tons.	31,729,691	6.3	5.9	3.9
Minnesota	3,946,072	6,036,747	Tons.	26,724,801	5.5	6.2	3.2
Hemp	7,647	7,483,295	Lbs.	412,699	100.0	100.0	100.0
Kentucky	*6,855*	*6,420,232*	*Lbs.*	*348,386*	*89.6*	*85.8*	*84.4*
California	300	600,000	Lbs.	39,000	3.9	8.0	9.5
Indiana	335	395,467	Lbs.	21,755	4.4	5.3	5.3
Hops	44,693	40,718,748	Lbs.	7,844,745	100.0	100.0	100.0
Oregon	21,770	16,582,562	Lbs.	2,838,860	48.7	40.7	36.2
New York	12,023	8,677,138	Lbs.	2,597,981	26.9	21.3	33.1
California	*8,391*	*11,994,953*	*Lbs.*	*1,731,110*	*18.8*	*29.5*	*22.1*
Washington	2,433	3,432,504	Lbs.	665,493	5.4	8.4	8.5
Kafir corn and milo maize	1,635,153	17,597,305	Bu.	10,816,940	100.0	100.0	100.0
Texas	*573,384*	*5,860,444*	*Bu.*	*3,785,463*	*35.1*	*33.3*	*35.0*
Kansas	388,495	5,115,415	Bu.	3,046,799	23.8	29.1	28.2
Oklahoma	532,515	4,658,752	Bu.	2,531,036	32.6	26.5	23.4
California	44,308	938,049	Bu.	725,704	2.7	5.3	6.7
Kumquats	....	1,112	Boxes.	2,826	....	100.0	100.0
Florida	....	1,091	Boxes.	2,768	....	98.1	97.9
Lemons	....	2,770,313	Boxes.	2,993,738	....	100.0	100.0
California	....	2,756,221	Boxes.	2,976,571	....	99.5	99.4
Limes	....	11,318	Boxes.	12,478	....	100.0	100.0
Florida	....	11,302	Boxes.	12,457	....	99.9	99.8
Loquats	....	4,541	Boxes.	5,880	....	100.0	100.0
California	....	4,516	Boxes.	5,830	....	99.4	99.1
Mandarins	....	3,896	Boxes.	6,553	....	100.0	100.0
Louisiana	....	*3,340*	*Boxes.*	*5,945*	....	*85.7*	*90.7*
California	....	555	Boxes.	607	....	14.2	9.3
Mangoes	....	....	....	....	....	....	....
Florida	....	*5,278*	*Boxes.*	*5,739*	....	*100.0*	*100.0*
Maple sirup	....	4,106,418	Gals.	3,797,317	....	100.0	100.0
Ohio	....	1,323,431	Gals.	1,071,330	....	32.2	28.2
New York	....	993,242	Gals.	907,046	....	24.2	23.9
Vermont	....	409,953	Gals.	366,006	....	10.0	9.6
Pennsylvania	....	391,242	Gals.	364,712	....	9.5	9.6
Michigan	....	269,093	Gals.	298,450	....	6.6	7.9
Indiana	....	273,728	Gals.	296,805	....	6.7	7.8
Maple sugar	....	14,060,206	Lbs.	1,380,492	....	100.0	100.0
Vermont	....	7,726,817	Lbs.	720,927	....	55.0	52.2
New York	....	*3,160,300*	*Lbs.*	*333,638*	....	*22.5*	*24.2*
Pennsylvania	....	1,188,049	Lbs.	106,501	....	8.4	7.7
Mint	8,195	158,091	Lbs.	253,000	100.0	100.0	100.0
Michigan	*6,360*	*121,169*	*Lbs.*	*194,391*	*77.6*	*76.6*	*76.8*
Indiana	1,814	36,621	Lbs.	58,110	22.1	23.2	23.0
Mustard seed	....	....	....	....	....	....	....
California	*1,964*	*3,168,270*	*Lbs.*	*100,731*	*100.0*	*100.0*	*100.0*
Nursery products	80,618	....	....	21,050,822	100.0	....	100.0
New York	8,680	....	....	2,750,957	10.8	....	13.1
California	4,803	....	....	2,212,788	6.0	....	10.5
Texas	3,847	....	....	1,253,110	4.8	....	6.0
Nuts (all)	....	62,328,010	Lbs.	4,447,674	....	100.0	100.0
California	....	28,378,115	Lbs.	2,959,845	....	45.5	66.5
Texas	....	*5,945,932*	*Lbs.*	*562,542*	....	*9.5*	*12.6*
Pennsylvania	....	3,795,804	Lbs.	90,447	....	6.1	2.0
Oats	35,159,441	1,007,142,980	Bu.	414,697,422	100.0	100.0	100.0
Illinois	*4,176,485*	*150,386,074*	*Bu.*	*59,693,819*	*11.9*	*14.9*	*14.4*
Iowa	4,655,154	128,198,055	Bu.	49,046,888	13.2	12.7	11.8
Minnesota	2,977,258	93,897,717	Bu.	34,023,389	8.5	9.3	8.2
Wisconsin	2,164,570	71,349,038	Bu.	28,663,257	6.2	7.1	6.9
North Dakota	2,147,032	65,886,702	Bu.	24,114,345	6.1	6.5	5.8
Ohio	1,787,496	57,591,046	Bu.	23,212,352	5.1	5.7	5.6
Nebraska	*2,365,774*	*53,360,185*	*Bu.*	*19,443,570*	*6.7*	*5.3*	*4.7*
Indiana	1,667,818	50,607,913	Bu.	18,928,706	4.7	5.0	4.6
Olives	....	16,405,493	Lbs.	404,574	....	100.0	100.0
California	....	16,132,412	Lbs.	401,277	....	98.3	99.2
Oranges	....	19,487,481	Boxes.	17,566,464	....	100.0	100.0
California	....	14,436,180	Boxes.	12,951,505	....	74.1	73.7
Florida	....	4,852,967	Boxes.	4,304,987	....	24.9	24.5
Peaches and nectarines	....	35,470,276	Bu.	28,781,078	....	100.0	100.0
California	....	9,267,118	Bu.	4,573,775	....	26.1	15.9
Georgia	....	2,555,499	Bu.	2,182,613	....	7.2	7.6
[illegible]	....	[illegible]	Bu.	[illegible]	....	[illegible]	[illegible]

TABLE 178.—*Crop production and States leading in production of each crop: 1909. (From Thirteenth Census report)*—Continued.

[The figures opposite the name of each crop are for the United States as a whole.]

Crop and State.	Acreage.	Production.	Unit.	Value.	Per cent of United States total. Acreage.	Production.	Value.
Peanuts	869,887	19,415,816	Bu.	$18,271,929	100.0	100.0	100.0
North Carolina	195,134	5,980,919	Bu.	5,368,826	22.4	30.8	29.4
Virginia	145,213	4,284,340	Bu.	4,239,832	16.7	22.1	23.2
Georgia	160,317	2,569,787	Bu.	2,440,926	18.4	13.2	13.4
Florida	126,150	2,315,089	Bu.	2,146,862	14.5	11.9	11.7
Alabama	100,609	1,573,796	Bu.	1,490,654	11.6	8.1	8.2
Texas	64,327	1,074,998	Bu.	1,075,110	7.4	5.5	5.9
Pears	....	8,840,733	Bu.	7,910,600	....	100.0	100.0
California	....	1,928,097	Bu.	1,660,963	....	21.8	21.0
New York	....	1,343,089	Bu.	1,418,218	....	15.2	17.9
Michigan	....	666,023	Bu.	535,771	....	7.5	6.8
New Jersey	....	463,290	Bu.	254,582	....	5.2	3.2
Peas (dry)	1,305,099	7,129,294	Bu.	10,963,739	100.0	100.0	100.0
Wisconsin	78,017	1,165,055	Bu.	1,645,928	6.0	16.3	15.0
Michigan	94,932	1,162,403	Bu.	1,337,430	7.3	16.3	12.2
South Carolina	[1] 265,632	711,853	Bu.	1,311,454	20.4	10.0	12.0
Georgia	[1] 210,315	736,009	Bu.	1,204,783	16.1	10.3	11.0
North Carolina	[1] 169,934	651,567	Bu.	1,024,228	13.0	9.1	9.3
Alabama	[1] 85,034	418,007	Bu.	660,270	6.5	5.9	6.0
Pecans	....	9,890,769	Lbs.	971,596	....	100.0	100.0
Texas	....	5,832,367	Lbs.	556,203	....	59.0	57.2
Mississippi	....	637,293	Lbs.	79,936	....	6.4	8.2
Louisiana	....	723,578	Lbs.	70,635	....	7.3	7.3
Oklahoma	....	894,172	Lbs.	59,481	....	9.0	6.1
Persimmons (Japanese)	....	6,723	Bu.	9,087	....	100.0	100.0
California	....	2,696	Bu.	3,344	....	40.1	36.8
Texas	....	1,175	Bu.	2,136	....	17.5	23.5
Florida	....	1,615	Bu.	2,066	....	24.0	22.7
Alabama	....	339	Bu.	402	....	5.0	4.4
Pineapples	....	778,651	Crates.	734,090	....	100.0	100.0
Florida	....	778,644	Crates.	734,069	....	99.9	99.9
Plums and prunes	....	15,480,170	Bu.	10,299,495	....	100.0	100.0
California	....	9,317,979	Bu.	5,473,539	....	60.2	53.1
Oregon	....	1,747,587	Bu.	838,783	....	11.3	8.1
Washington	....	1,032,077	Bu.	600,503	....	6.7	5.8
Pomegranates	....	152,825	Lbs.	4,203	....	100.0	100.0
California	....	30,075	Lbs.	968	....	19.7	23.0
Georgia	....	27,365	Lbs.	920	....	17.9	21.9
Nevada	....	45,550	Lbs.	915	....	29.8	21.8
Alabama	....	19,090	Lbs.	617	....	12.5	14.7
Arizona	....	23,360	Lbs.	477	....	15.3	11.3
Potatoes	3,668,855	389,194,965	Bu.	166,423,910	100.0	100.0	100.0
New York	394,319	48,597,701	Bu.	20,338,766	10.7	12.5	12.2
Pennsylvania	262,013	21,740,611	Bu.	11,973,843	7.1	5.6	7.2
Maine	135,799	28,556,837	Bu.	10,224,714	3.7	7.3	6.1
Michigan	365,483	38,243,828	Bu.	9,913,778	10.0	9.8	6.0
Ohio	212,808	20,322,984	Bu.	9,377,955	5.8	5.2	5.6
Wisconsin	290,185	31,968,195	Bu.	7,917,754	7.9	8.2	4.8
Minnesota	223,692	26,802,948	Bu.	7,685,259	6.1	6.9	4.6
Quinces	....	428,672	Bu.	517,243	....	100.0	100.0
New York	....	132,451	Bu.	135,345	....	30.9	26.2
Pennsylvania	....	62,850	Bu.	102,431	....	14.5	19.8
Ohio	....	81,101	Bu.	101,369	....	18.9	19.6
California	....	32,638	Bu.	26,266	....	7.6	5.1
Raspberries and loganberries	48,668	60,918,196	Qts.	5,132,277	100.0	100.0	100.0
New York	11,057	14,751,940	Qts.	1,168,062	22.7	24.2	22.8
Michigan	8,786	8,381,943	Qts.	695,019	18.1	13.8	13.5
Ohio	3,869	4,029,480	Qts.	364,272	7.9	6.6	7.1
California	1,992	5,222,117	Qts.	304,169	4.1	8.6	5.9
Washington	1,210	3,118,720	Qts.	223,001	2.5	5.1	4.3
Rice (rough)	610,175	21,838,580	Bu.	16,019,607	100.0	100.0	100.0
Louisiana	317,518	10,839,973	Bu.	8,053,222	52.0	49.6	50.3
Texas	237,586	8,991,745	Bu.	6,106,323	38.9	41.2	38.1
Arkansas	27,419	1,282,830	Bu.	1,158,103	4.5	5.9	7.2
Rye	2,195,561	29,520,457	Bu.	20,421,812	100.0	100.0	100.0
Michigan	419,020	5,814,394	Bu.	3,944,646	19.1	19.7	19.3
Wisconsin	339,213	4,797,775	Bu.	3,163,520	15.5	16.3	15.5
Minnesota	266,967	4,438,028	Bu.	2,679,987	12.1	15.0	13.1
Pennsylvania	272,560	3,496,603	Bu.	2,673,514	12.4	11.8	13.1
New York	130,646	2,010,901	Bu.	1,576,406	5.9	6.8	7.7
Seed (flower and vegetable)	....	....	....	1,411,613	....	....	100.0
California	....	....	....	594,724	....	....	42.1
Illinois	....	....	....	194,626	....	....	13.8
New York	....	....	....	72,901	....	....	5.2

[1] A considerable amount of this acreage is probably a duplication of other crop acreage.

TABLE 178.—*Crop production and States leading in production of each crop: 1909. (From Thirteenth Census report)*—Continued.

[The figures opposite the name of each crop are for the United States as a whole.]

Crop and State.	Acreage.	Production.	Unit.	Value.	Per cent of United States total.		
					Acreage.	Production.	Value.
Seed (grass)	....	6,671,348	Bu.	$15,137,683	....	100.0	100.0
Iowa	....	1,118,044	Bu.	1,721,289	....	16.8	11.4
Illinois	....	1,289,996	Bu.	1,719,420	....	19.3	11.4
Minnesota	....	945,666	Bu.	1,496,438	....	14.2	9.9
South Dakota	....	424,023	Bu.	594,570	....	6.4	3.9
Kentucky	....	612,406	Bu.	538,219	....	9.2	3.6
Sorghum cane	444,089	1,647,262	Tons.	[1] 10,174,457	100.0	100.0	100.0
Kentucky	62,327	226,303	Tons.	1,416,565	14.0	13.7	13.9
Tennessee	52,907	205,901	Tons.	1,145,932	11.9	12.5	11.3
Missouri	45,088	201,206	Tons.	1,036,263	10.2	12.2	10.2
Texas	55,027	101,691	Tons.	955,769	12.4	6.2	9.4
Arkansas	33,071	93,123	Tons.	658,075	7.4	5.7	6.5
North Carolina	21,227	86,462	Tons.	541,294	4.8	5.2	5.3
Illinois	15,039	90,287	Tons.	496,114	3.4	5.5	4.9
Strawberries	143,045	255,702,035	Qts.	17,913,926	100.0	100.0	100.0
New York	6,382	15,945,863	Qts.	1,187,410	4.5	6.2	6.6
California	4,585	15,694,326	Qts.	1,149,475	3.2	6.1	6.4
Missouri	9,048	15,171,034	Qts.	1,122,784	6.3	5.9	6.3
Maryland	14,292	23,611,095	Qts.	1,070,072	10.0	9.2	6.0
Michigan	8,051	14,218,768	Qts.	1,000,788	5.6	5.6	5.6
New Jersey	8,684	18,767,473	Qts.	920,108	6.1	7.3	5.2
Sugar cane	476,849	6,240,260	Tons.	[2] 26,415,952	100.0	100.0	100.0
Louisiana	329,684	4,941,996	Tons.	[2] 17,752,537	69.1	79.2	67.2
Georgia	37,046	317,460	Tons.	[2] 2,268,110	7.8	5.1	8.6
Sunflower seed	4,731	63,677	Bu.	58,318	100.0	100.0	100.0
Illinois	3,969	49,004	Bu.	44,539	83.9	77.0	76.4
California	257	6,855	Bu.	6,264	5.4	10.8	10.7
Indiana	430	6,330	Bu.	5,894	9.1	9.9	10.1
Sweet potatoes and yams	641,255	59,232,070	Bu.	35,429,176	100.0	100.0	100.0
Georgia	84,038	7,426,131	Bu.	4,349,806	13.1	12.5	12.3
North Carolina	84,740	8,493,283	Bu.	4,333,297	13.2	14.3	12.2
Alabama	66,613	5,314,857	Bu.	3,578,710	10.4	9.0	10.1
Mississippi	56,045	4,427,988	Bu.	3,073,290	8.7	7.6	8.7
Virginia	40,838	5,270,202	Bu.	2,681,472	6.4	8.9	7.6
South Carolina	48,878	4,319,926	Bu.	2,606,606	7.6	7.3	7.4
Louisiana	56,953	4,251,086	Bu.	2,357,729	8.9	7.2	6.7
New Jersey	22,504	3,186,499	Bu.	1,527,074	3.5	5.4	4.8
Tangerines	....	38,752	Boxes.	68,770	....	100.0	100.0
Florida	....	34,871	Boxes.	64,082	....	90.2	93.2
California	....	3,581	Boxes.	4,188	....	9.2	6.1
Teasels	162	78	Tons.	13,760	100.0	100.0	100.0
New York	110	61	Tons.	10,760	67.9	78.2	78.2
Tobacco	1,294,911	1,055,764,806	Lbs.	104,302,856	100.0	100.0	100.0
Kentucky	469,795	398,482,301	Lbs.	39,868,753	36.3	37.7	38.2
North Carolina	221,890	138,813,163	Lbs.	13,847,559	17.1	13.1	13.3
Virginia	185,427	132,979,390	Lbs.	12,169,086	14.3	12.6	11.7
Ohio	106,477	88,603,308	Lbs.	8,998,887	8.2	8.4	8.6
Tennessee	90,468	68,756,599	Lbs.	5,661,681	7.0	6.5	5.4
Vegetables [3]	2,763,269	....	....	216,257,068	100.0	....	100.0
New York	175,402	....	....	15,963,384	6.3	....	7.4
Ohio	123,461	....	....	11,393,791	4.5	....	5.3
Walnuts (Persian or English)	....	22,026,524	Lbs.	2,297,336	....	100.0	100.0
California	....	21,432,266	Lbs.	2,247,193	....	97.3	97.8
Wheat	44,262,592	683,379,259	Bu.	657,656,801	100.0	100.0	100.0
North Dakota	8,188,782	116,781,886	Bu.	109,129,869	18.5	17.1	16.6
Kansas	5,973,785	77,577,115	Bu.	74,052,291	13.5	11.4	11.3
Minnesota	3,276,911	57,094,412	Bu.	56,007,435	7.4	8.4	8.5
Nebraska	2,662,918	47,685,745	Bu.	44,225,930	6.0	7.0	6.7
South Dakota	3,217,255	47,059,590	Bu.	42,878,223	7.3	6.9	6.5
Illinois	2,185,091	37,830,732	Bu.	38,000,712	4.9	5.5	5.8
Washington	2,118,015	40,920,390	Bu.	35,102,370	4.8	6.0	5.3
Willows	661	857	Tons.	44,175	100.0	100.0	100.0
New York	405	667	Tons.	19,038	61.3	77.8	43.1
Maryland	159	112	Tons.	16,800	24.1	13.1	38.0

TABLE 179.—*Tonnage carried on railways in the United States, 1911–1913.*[1]

Product.	Year ending June 30—		
	1911	1912	1913 (prelim.)
FARM PRODUCTS.			
Animal matter:	*Short tons.*	*Short tons.*	*Short tons.*
Animals, live	13,991,000	14,147,000	15,042,000
Packing-house products—			
Dressed meats	2,330,000	2,346,000	2,407,000
Hides (including leather)	1,096,000	1,139,000	1,121,000
Other packing-house products	2,249,000	2,360,000	2,345,000
Total packing-house products	5,675,000	5,845,000	5,873,000
Poultry (including game and fish)	719,000	768,000	847,000
Wool	375,000	407,000	398,000
Other animal matter	3,003,000	3,807,000	4,286,000
Total animal matter	23,763,000	24,974,000	26,446,000
Vegetable matter:			
Cotton	3,486,000	4,953,000	3,942,000
Fruit and vegetables	11,747,000	12,880,000	16,099,000
Grain and grain products—			
Grain	41,058,000	39,299,000	50,945,000
Grain products—			
Flour	8,634,000	8,629,000	9,523,000
Other grain products	6,490,000	7,081,000	7,830,000
Total grain and grain products	56,182,000	55,009,000	68,298,000
Hay	6,307,000	6,828,000	7,145,000
Sugar	2,883,000	3,233,000	3,599,000
Tobacco	934,000	982,000	1,091,000
Other vegetable matter	6,910,000	10,125,000	9,493,000
Total vegetable matter	88,449,000	94,010,000	109,667,000
Total farm products	112,212,000	118,984,000	136,113,000
OTHER FREIGHT.			
Products of mines	539,256,000	566,538,000	650,940,000
Products of forests	108,506,000	100,148,000	112,079,000
Manufactures	132,293,000	136,716,000	161,933,000
All other (including all freight in less than carload lots)	74,967,000	75,897,000	83,775,000
Total tonnage	967,234,000	998,283,000	1,144,840,000

[1] Compiled from reports of the Interstate Commerce Commission. Original shipments only, excluding freight received by each railway from connecting railways and other carriers.

IMPORTS AND EXPORTS OF AGRICULTURAL PRODUCTS.[1]

TABLE 180.—*Agricultural imports of the United States during the 3 years ending June 30, 1914.*

Article imported.	Year ending June 30— 1912 Quantity.	1912 Value.	1913 Quantity.	1913 Value.	1914 Quantity.	1914 Value.
ANIMAL MATTER.						
Animals, live:						
Cattle—						
For breeding purposes, number	2,120	$305,222	1,388	$234,489	718,352	$16,328,819
Other ....number..	316,243	4,500,352	420,261	6,406,179	150,016	2,367,899
Total cattle......do....	318,372	4,805,574	421,649	6,640,668	868,368	18,696,718
Horses—						
For breeding purposes, number	3,849	1,579,377	5,713	1,653,713	4,406	1,476,905
Other..........number..	2,758	343,648	4,295	472,102	28,613	1,128,124
Total horses......do....	6,607	1,923,025	10,008	2,125,875	33,019	2,605,029
Sheep—						
For breeding purposes, number	2,208	29,106	388	8,903	221,836	516,912
Other..........number..	21,380	128,151	15,040	81,118	1,883	15,492
Total sheep.......do....	23,588	157,257	15,428	90,021	223,719	532,404
All other, including fowls....	....	694,699	....	729,227	....	2,877,960
Total live animals.......	....	7,580,555	....	9,585,791	....	24,712,111
Beeswax...........pounds..	1,076,741	328,752	828,703	253,867	1,412,200	476,364
Dairy products:						
Butter..............do....	1,025,668	237,154	1,162,253	304,090	7,842,022	1,753,401
Cheese..............do....	46,542,007	8,807,249	49,387,944	9,185,184	63,784,313	11,010,693
Cream............gallons..	1,120,427	923,779	1,247,083	1,068,109	1,773,152	1,540,549
Milk....................	....	61,671	....	135,724	....	1,089,440
Total dairy products....	....	10,029,853	....	10,603,107	....	15,403,143
Eggs...............dozens..	973,053	147,173	1,367,224	205,832	6,014,955	1,089,164
Egg yolks..........pounds..	43,822	4,430	228,305	36,892	3,420,412	504,619
Feathers and downs, crude:						
Ostrich..................	....	3,806,696	....	6,252,298	....	3,944,928
Other....................	....	*1,228,645*	....	1,985,084	....	926,735
Fibers, animal:						
Silk—						
Cocoons.........pounds..	82,456	51,073	158,342	55,580	1,413	1,118
Raw, or as reeled from the cocoon.........pounds..	21,609,520	67,173,382	26,049,472	82,147,523	28,594,672	97,828,243
Waste.............do....	4,892,986	2,317,217	5,893,741	2,711,605	5,949,744	3,100,664
Total silk.........do....	26,584,962	69,541,672	32,101,555	84,914,717	34,545,829	100,930,025
Wool, and hair of the camel, goat, alpaca, and like animals—						
Class 1, clothing..pounds..	71,203,329	15,106,193	67,238,715	15,422,920	125,088,761	30,681,759
Class 2, combing....do....	*15,557,664*	*3,802,034*	*16,886,446*	4,266,327	*18,839,698*	4,909,967
Class 3, carpet......do....	106,639,720	14,170,115	111,168,094	15,890,576	102,003,313	17,029,111
Hair of the Angora goat, alpaca, etc.....pounds..	(2)	(2)	(2)	(2)	1,717,097	572,430
Total wool......do....	193,400,713	33,078,342	195,293,255	35,579,823	247,648,869	53,190,267
Total animal fibers, pounds............	219,985,675	102,620,014	227,394,810	120,494,540	282,194,698	154,120,292
Gelatin...............pounds..	783,668	181,461	1,170,082	314,601	2,441,317	738,731
Glue..................do....	7,534,322	776,696	6,550,197	727,850	22,714,877	1,805,543
Honey..............gallons..	115,040	62,684	116,271	68,717	75,079	38,665

[1] Forest products come within the scope of the Department of Agriculture and are therefore included in alphabetical order in these tables.
[2] Not stated.

TABLE 180.—*Agricultural imports of the United States during the 3 years ending June 30, 1914*—Continued.

Article imported.	Year ending June 30—					
	1912		1913		1914	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
ANIMAL MATTER—continued.						
Packing-house products:						
Bladders, other than fish	....	$41,954	....	$96,237	....	$52,336
Blood, dried	....	215,255	....	80,145	....	391,816
Bones, cleaned	....	18,512	....	40,612	....	5,023
Bones, hoofs, and horns	....	1,038,653	....	885,893	....	1,061,466
Bristles—						
Crude, unsorted..pounds..	26,174	14,796	19,151	12,583	28,359	25,495
Sorted, bunched, or prepared........pounds..	3,435,801	3,032,231	3,559,433	3,491,980	3,408,796	3,170,974
Total bristles..pounds..	*3,461,975*	*3,047,027*	*3,578,584*	*3,504,563*	*3,437,155*	*3,196,469*
Grease	....	963,205	....	865,443	....	1,028,595
Gut	....	132,929	....	139,120	....	122,733
Hair—						
Horse............pounds..	*5,381,730*	*2,308,319*	*5,147,923*	*2,223,344*	*3,738,536*	*1,663,448*
Other animal.......do....	10,795,253	1,025,421	11,348,597	1,099,730	10,507,680	1,051,698
Hide cuttings and other glue stock	....	1,707,171	....	1,767,382	....	2,158,814
Hides and skins, other than furs—						
Buffalo hides—						
Dry............pounds..	4,906,362	732,465	16,234,751	2,790,009	14,492,943	3,073,717
Green or pickled..do....	82,313	8,789	....	....	....	....
Calf skins—						
Dry..............do....	41,992,100	14,697,085	39,974,383	15,092,017	27,767,882	11,582,807
Green or pickled..do....	63,260,389	11,833,908	*54,584,752*	*11,202,956*	*54,635,708*	*11,799,146*
Cattle hides—						
Dry..............do....	78,131,330	15,161,229	82,595,225	18,670,672	71,485,650	18,083,314
Green or pickled..do....	172,881,183	23,244,292	185,447,165	27,628,292	208,477,838	34,098,628
Goatskins—						
Dry..............do....	69,143,153	19,930,142	70,562,896	21,099,415	63,374,054	19,037,307
Green or pickled..do....	26,197,550	3,366,413	25,887,409	3,891,002	21,385,374	3,153,956
Horse and ass skins—						
Dry..............do....	7,194,331	1,474,590	10,978,605	2,234,581	7,619,625	1,619,178
Green or pickled..do....	5,674,741	597,397	8,447,909	941,371	4,645,213	514,833
Kangaroo..........do....	(1)	(1)	1,097,038	719,188	1,328,668	898,087
Sheepskins [2]—						
Dry..............do....	25,644,846	4,977,912	31,132,037	6,429,936	29,338,146	6,165,947
Green or pickled..do....	34,755,463	4,858,304	40,652,682	5,965,008	40,738,679	6,427,270
Other..............do....	7,904,337	1,593,801	4,801,838	921,727	15,780,906	3,835,591
Total hides and skins, pounds	537,768,098	102,476,327	572,196,690	117,386,174	561,070,686	120,289,781
Meat—						
Cured—						
Bacon and hams, pounds	(3)	(3)	(3)	(3)	2,008,960	383,669
Meat, prepared or preserved	....	(3)	....	(3)	....	1,676,360
Sausage, bologna, pounds	971,775	182,982	728,469	157,871	730,326	186,824
Fresh—						
Beef and veal..pounds..	(3)	(3)	(3)	(3)	180,137,183	15,423,911
Mutton and lamb.do....	(3)	(3)	(3)	(3)	12,710,905	1,414,736
Pork..............do....	(3)	(3)	(3)	(3)	4,624,799	540,801
Other, including meat extracts	....	1,176,010	....	1,268,957	....	1,075,849
Total meat	....	1,358,992	....	1,426,828	....	20,402,144
Oleo stearin........pounds..	4,913,090	448,960	9,511,134	967,600	5,243,563	459,959
Rennets	....	102,142	....	129,567	....	139,720
Sausage casings....pounds..	4,923,766	2,385,715	4,569,944	2,476,982	(3)	2,955,667
Total packing-house products	....	117,270,572	....	133,088,110	....	154,969,369
Total animal matter	....	244,097,551	....	[illegible]	....	[illegible]

[1] ...cluded in "Other" hides and skins other than furs.
[2] ...xcept sheepskins with the wool on.
[3] ...ot stated.

TABLE 180.—*Agricultural imports of the United States during the 3 years ending June 30, 1914*—Continued.

Article imported.	Year ending June 30—					
	1912		1913		1914	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER.						
Argols, or wine lees...pounds..	23,601,078	$2,225,180	29,479,119	$2,621,632	29,793,011	$3,228,674
Breadstuffs, (*See* Grain and grain products.)						
Broom corn........long tons..	1,346	157,969	187	14,720	1,272	141,730
Cocoa and chocolate:						
Cocoa—						
Crude, and leaves and shells of........pounds..	145,968,945	15,931,556	140,039,172	17,389,042	176,267,646	20,797,790
Chocolate.............do....	2,816,901	658,844	3,470,680	787,678	3,096,445	706,193
Total cocoa and chocolate..........pounds..	148,785,846	16,590,400	143,509,852	18,176,720	179,364,091	21,503,983
Coffee..................do....	885,201,247	117,826,543	863,130,757	118,963,209	1,001,528,317	110,725,392
Coffee substitutes:						
Chicory root—						
Raw, unground..pounds..	5,401	125	2,205,813	33,091	(1)	(1)
Roasted, ground, or otherwise prepared, pounds..............	679,511	33,530	519,179	21,182	2,292,430	47,882
Total chicory root, pounds..............	684,912	33,655	2,724,992	54,273	2,292,430	47,882
Other............pounds..	70,810	14,275	146,897	22,831	188,446	21,498
Total coffee substitutes, pounds..............	755,722	47,930	2,871,889	77,104	2,480,876	69,380
Curry and curry powder......	....	10,441	....	11,199	....	11,861
Fibers, vegetable:						
Cotton.............pounds..	109,780,071	20,217,581	121,852,016	22,987,318	123,346,899	19,456,588
Flax.............long tons..	10,900	3,778,501	12,421	3,950,020	9,885	2,870,274
Hemp................do....	5,007	1,100,273	7,663	1,484,116	8,822	1,564,483
Istle, or Tampico fiber.do....	9,835	776,351	9,573	923,104	10,660	1,036,431
Jute and jute butts...do....	101,001	7,183,385	125,389	9,280,565	106,033	11,174,028
Kapoc...............do....	2,099	570,084	2,842	809,001	1,827	441,109
Manila..............do....	68,536	8,000,865	73,823	12,629,693	49,688	9,779,539
New Zealand flax.....do....	5,364	483,310	7,827	917,166	6,171	716,953
Sisal grass...........do....	114,467	11,866,843	153,869	17,803,819	215,547	25,860,729
Other...............do....	9,270	703,254	13,691	1,281,175	9,799	906,449
Total vegetable fibers...	....	54,680,447	....	72,065,977	....	73,806,583
Flowers, natural..............	....	15,018	....	13,376	....	24,540
Forest products:						
Charcoal....................	....	29,586	....	25,028	....	60,634
Cinchona bark.....pounds..	2,891,823	233,323	3,553,239	357,490	3,648,868	464,412
Cork wood or cork bark......	....	3,242,319	....	3,152,070	....	3,851,794
Dyewoods, and extracts of—						
Dyewoods—						
Logwood.....long tons..	39,571	476,983	37,027	476,916	30,062	378,064
Other..............do....	3,141	47,315	3,973	55,843	7,663	108,928
Total dyewoods.do....	42,712	524,298	41,000	532,759	37,725	486,992
Extracts and decoctions of..............pounds..	9,297,084	353,245	9,481,275	365,149	8,810,040	306,934
Total dyewoods, and extracts of............	....	877,543	....	897,908	....	793,926
Guayule plant.....pounds..	2,000	45	294,335	14,725	....	....
Gums—						
Camphor—						
Crude..............do....	2,154,646	682,609	3,709,264	1,007,301	3,476,908	929,715
Refined............do....	244,205	91,420	481,256	162,557	566,106	182,790

TABLE 180.—*Agricultural imports of the United States during the 3 years ending June 30, 1914*—Continued.

Article imported.	Year ending June 30—					
	1912		1913		1914	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—contd.						
Forest products—Continued.						
Gums—Continued.						
Copal, kauri, and damar, pounds	25,115,739	$2,016,474	28,573,201	$2,519,519	32,693,412	$3,354,679
Gambier, or terra japonica, pounds	21,002,795	1,031,047	17,064,998	790,081	14,936,129	571,067
India rubber, gutta percha, etc.—						
Balata .... pounds	1,517,066	984,012	1,319,598	766,772	1,533,024	793,126
Guayule gum ..... do	14,238,625	6,463,787	10,218,191	4,345,088	1,475,804	607,076
Guta-joolatong, or East Indian gum .. pounds	48,795,268	2,255,050	45,345,338	2,174,441	24,926,571	1,155,402
Gutta-percha ..... do	1,204,406	225,797	480,853	167,313	1,846,109	323,567
Indian rubber .... do	110,210,173	93,013,255	113,384,359	90,170,316	131,995,742	71,219,851
Total India rubber, etc .... pounds	175,965,538	102,941,901	170,747,339	97,623,930	161,777,250	74,099,022
Shellac .... *pounds*	18,745,771	2,296,263	21,912,015	3,046,919	16,719,756	2,889,269
Other	....	1,943,405	....	2,359,796	....	2,001,631
Total gums	....	114,130,192	....	112,792,825	....	86,840,631
Ivory, vegetable ... pounds	23,076,847	789,602	29,656,278	977,525	27,135,406	881,354
Naval stores:						
Tar and pitch (of wood), *barrels*	679	6,227	287	5,611	561	7,946
Turpentine, spirits of, gallons	60,913	22,805	56,855	19,667	68,966	28,818
Total naval stores	....	29,032	....	25,278	....	36,764
Palm leaf, natural	....	*32,641*	....	*17,214*	....	*14,044*
Tanning materials:						
Mangrove bark. long tons	21,779	483,920	15,187	336,139	7,689	196,891
Quebracho, extract of, pounds	71,635,043	2,320,036	78,833,466	2,005,770	93,329,087	2,543,302
Quebracho wood .. l. tons	68,174	982,315	102,769	1,300,126	73,956	900,880
Sumac, ground .. pounds	12,498,376	235,154	14,489,776	297,506	10,770,400	258,738
Other	....	268,821	....	390,056	....	468,230
Total tanning materials	....	4,290,246	....	4,329,594	....	4,368,041
Wood, not elsewhere specified—						
Brier root or brierwood and ivy or laurel root	....	358,111	....	313,189	....	241,498
Chair cane or reed	....	575,221	....	620,893	....	451,099
Cabinet woods, unsawed—						
Cedar .... M feet	15,035	807,699	19,092	1,094,048	17,285	982,152
Mahogany .... do	43,194	3,038,043	66,318	4,839,625	70,470	4,925,126
Other	....	1,107,975	....	1,441,541	....	1,217,410
Total cabinet woods	....	4,953,717	....	7,375,214	....	7,124,688
Logs and round timber, M feet	155,007	1,593,099	140,876	1,506,235	148,938	1,657,695
Lumber—						
Boards, deals, planks, and other sawed lumber .... M feet	905,275	15,802,789	1,091,649	18,969,776	931,408	17,817,550
Laths .... M	646,662	1,619,919	712,119	1,905,254	564,776	1,613,596
Shingles .... M	514,667	1,305,327	563,297	1,399,751	895,028	2,199,170
Other	....	1,175,342	....	885,888	....	815,279
Total lumber	....	19,903,377	....	23,160,669	....	22,446,595

TABLE 180.—*Agricultural imports of the United States during the 3 years ending June 30, 1914*—Continued.

Article imported.	Year ending June 30— 1912 Quantity.	1912 Value.	1913 Quantity.	1913 Value.	1914 Quantity.	1914 Value.
VEGETABLE MATTER—contd.						
Forest products—Continued.						
Wood, not elsewhere specified—Continued.						
Pulp wood—						
Peeled............cords..	484,277	$2,928,768	618,124	$3,843,950	630,868	$4,062,835
Rossed............do....	238,242	1,910,283	258,455	2,183,785	285,844	2,118,910
Rough.............do....	178,751	995,777	160,315	927,217	186,316	1,063,721
Rattan and reeds.........	....	898,552	....	1,040,121	....	1,210,390
All other.................	....	633,109	....	776,108	....	559,036
Total wood, n. e. s......	....	34,650,014	....	41,747,471	....	40,926,362
Wood pulp—						
Chemical—						
Bleached....pounds..	161,074,535	3,436,114	163,782,137	3,726,685	177,833,052	4,152,036
Unbleached.....do....	476,680,044	7,266,271	598,574,507	9,435,942	605,926,470	10,138,707
Mechanical.......do....	*431,863,879*	*3,516,537*	*364,168,563*	*3,002,689*	*354,967,673*	*2,732,595*
Total wood pulp...do..	1,069,618,458	14,218,922	1,126,525,207	16,165,316	1,138,727,195	17,023,338
Total forest products...	....	*172,523,465*	....	*180,502,444*	....	*155,261,300*
Fruits:						
Fresh or dried—						
Bananas........bunches..	44,520,539	14,368,330	42,357,109	14,484,258	48,683,592	16,397,884
Currants.........pounds..	33,151,396	1,561,350	30,843,735	1,306,410	32,033,177	1,233,228
Dates..............do....	25,208,248	536,983	34,304,951	660,311	34,073,608	679,527
Figs...............do....	18,765,408	934,763	16,837,819	944,317	19,284,868	941,207
Grapes........cubic feet..	2,000,841	2,331,504	1,135,942	1,359,415	1,334,163	1,599,969
Lemons..........pounds..	145,639,396	3,368,863	151,416,412	4,300,206	(1)	5,981,635
Olives............gallons..	5,076,857	2,303,277	3,946,076	1,896,982	5,316,364	2,292,837
Oranges.........pounds..	7,628,662	108,880	12,252,960	233,760	(1)	93,472
Pineapples................	....	1,110,341	....	1,319,006	....	1,287,862
Raisins..........pounds..	3,255,861	295,466	2,579,705	241,630	4,554,549	309,511
Other.....................	....	1,693,516	....	1,115,330	....	1,710,009
Total fresh or dried......	....	28,613,273	....	27,861,685	....	32,527,141
Prepared or preserved......	....	936,107	....	705,399	....	1,111,193
Total fruits.............	....	29,549,380	....	28,657,084	....	33,638,334
Ginger, preserved or pickled, pounds..................	468,329	30,139	551,320	42,061	478,058	36,434
Grain and grain products:						
Grain—						
Corn.............bushels..	*53,425*	*47,936*	*903,062*	*491,079*	*12,367,369*	*7,917,243*
Oats...............do....	2,622,357	1,053,470	723,899	289,364	22,273,624	7,885,837
Wheat.............do....	*2,699,130*	*2,212,887*	*798,028*	*559,559*	*1,978,937*	*1,761,995*
Total grain.......do....	5,374,912	*3,314,293*	*2,424,989*	*1,340,002*	*36,619,930*	*17,565,075*
Grain products—						
Bread and biscuit.........	....	282,753	....	255,416	....	415,318
Macaroni, vermicelli, etc., pounds................	108,231,028	4,738,937	106,500,752	4,913,624	126,128,621	5,698,783
Malt.............bushels..	3,771	5,098	10,419	15,121	13,472	16,367
Meal and flour—						
Wheat flour....barrels..	158,777	665,346	107,558	453,681	89,911	363,865
Other...................	....	3,418,685	....	1,754,842	....	3,382,879
Total grain products..	....	9,110,819	....	7,392,684	....	*9,677,202*
Total grain and grain products..............	....	12,425,112	....	8,732,686	....	27,442,277
Hay...............long tons..	699,004	6,473,230	156,323	1,514,311	170,786	1,684,390
Hops.................pounds..	2,991,125	2,231,348	8,494,144	2,852,865	5,382,028	2,790,516
Indigo................do....	7,658,067	1,153,142	7,712,508	1,102,897	8,125,211	1,093,226
Licorice root........do....	74,562,225	*1,309,789*	*105,116,227*	*1,806,060*	*115,636,131*	*2,047,193*

TABLE 180.—*Agricultural imports of the United States during the 3 years ending June 30, 1914*—Continued.

Article imported.	Year ending June 30— 1912 Quantity.	1912 Value.	1913 Quantity.	1913 Value.	1914 Quantity.	1914 Value.
VEGETABLE MATTER—contd.						
Liquors, alcoholic:						
Distilled spirits—						
Brandy.......proof galls..	*509,286*	*$1,316,031*	*610,358*	*$1,647,277*	*602,563*	*$1,617,483*
Cordials, liqueurs, etc., proof galls............	532,151	1,052,929	575,290	1,233,700	515,575	1,063,287
Gin..........proof galls..	824,604	915,422	974,776	999,921	1,055,885	1,017,569
Whisky............do....	1,373,010	2,833,917	1,541,663	3,153,640	1,571,870	3,186,627
Other..............do....	411,595	344,929	378,623	339,619	414,950	378,902
Total distilled spirits, proof galls............	3,650,736	6,463,228	4,080,710	7,374,157	4,160,843	7,263,848
Malt liquors—						
Bottled..........gallons..	1,651,564	1,571,336	1,452,728	1,372,823	1,213,320	1,152,598
Unbottled..........do....	5,523,941	1,708,590	6,245,922	1,917,442	5,963,913	1,814,431
Total malt liquors.do....	7,175,505	3,279,926	7,698,650	3,290,265	7,177,233	2,967,029
Wines—						
Champagne and other sparkling..doz. quarts..	281,134	4,688,090	280,828	4,636,191	270,002	4,418,958
Still wines—						
Bottled..dozen quarts..	*577,244*	*2,414,621*	*678,131*	*2,724,471*	*728,303*	*2,940,277*
Unbottled......gallons..	3,864,070	2,488,740	4,427,130	2,718,045	5,220,380	2,757,434
Total still wines.......	....	4,903,361	....	5,442,516	....	5,697,711
Total wines..........	....	9,591,451	....	10,078,707	....	10,116,669
Total alcoholic liquors.	....	*19,334,605*	....	*20,743,129*	....	*20,347,546*
Malt, barley. (*See* Grain and grain products.)						
Malt extract, fluid and solid...	....	*8,639*	....	*12,040*	....	*16,566*
Malt liquors. (*See* Liquors, alcoholic.)						
Nursery stock:						
Plants, trees, shrubs, and vines—						
Fruit plants, tropical and semitropical, for propagation, etc..............	....	24,825	....	5,847	....	....
Bulbs, bulbous roots or corms, cultivated for their flowers or foliage.....M..	216,159	1,723,354	288,646	1,823,307	216,138	2,092,139
Other......................	....	1,251,365	....	1,379,913	....	1,514,669
Total nursery stock.....	....	2,999,544	....	3,209,067	....	3,606,808
Nuts:						
Almonds—						
Shelled...........pounds..	17,231,458	3,253,495	13,078,771	3,137,104	13,307,631	4,040,785
Unshelled...........do....			2,592,187	207,554	5,730,774	638,504
Cocoanuts, unshelled.........	....	1,949,406	....	1,781,377	....	2,133,416
Cocoanut meat, broken, or copra—						
Not shredded, desiccated, or prepared....pounds..	64,580,670	2,810,171	34,267,811	1,531,820	45,437,155	2,295,013
Shredded, desiccated, or prepared.......pounds..	5,331,828	404,969	6,602,556	493,763	10,297,554	807,198
Cream and *Brazil*..bushels..	*21,539,508*	*1,092,671*	*11,023,445*	668,534	20,423,497	1,075,907
Filberts—						
Shelled...........pounds..	11,198,991	813,642	1,946,488	281,460	1,643,507	261,795
Unshelled...........do....			8,480,818	614,023	10,992,962	834,078
Peanuts—						
Shelled.............do....	12,930,563	473,065	6,801,415	312,387	27,077,158	1,239,227
Unshelled...........do....	2,627,475	192,217	12,281,580	470,890	17,472,631	860,010
Walnuts—						
Shelled.............do....	37,212,674	4,069,515	10,371,128	2,206,261	8,928,029	2,942,690
Unshelled...........do....			16,201,313	1,293,729	28,267,699	2,296,801
Other......................	....	858,852	....	983,497	....	1,463,197
Total nuts.............	....	15,828,003	....	13,979,905	....	19,899,001
Oil cake.............pounds..	16,[illegible]	294,746	11,047,[illegible]	141,437	11,[illegible]	[illegible]

TABLE 180.—*Agricultural imports of the United States during the 3 years ending June 30, 1914*—Continued.

Article imported.	Year ending June 30—					
	1912		1913		1914	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—contd.						
Oils, vegetable:						
Fixed or expressed—						
Cocoa butter or butterine, pounds	6,074,741	$1,615,377	3,603,332	$992,358	2,838,761	$793,451
Coconut oil......pounds	46,370,732	3,851,279	50,504,192	4,183,036	74,386,213	6,703,942
Cottonseed......do	1,513,051	78,077	3,383,511	185,383	17,293,201	1,044,834
Flaxseed or linseed, gallons	737,256	486,060	173,690	111,228	192,282	91,555
Hemp and rape seed—						
Hempseed......gallons	126	159	....	(1)	....	(1)
Rapeseed......do	1,182,768	568,138	1,549,728	779,400	1,464,266	704,055
Nut oil, or oil of nuts, n. e. s.—						
Chinese nuts...gallons	4,767,596	2,383,503	5,996,666	2,733,884	4,932,444	1,962,389
Peanut......do	895,587	582,740	1,195,683	820,763	1,337,136	918,614
Olive for mechanical purposes......gallons	636,013	389,539	619,356	407,074	763,924	477,210
Olive, salad......do	4,836,515	6,170,882	5,221,001	6,739,172	6,217,560	7,916,960
Palm oil......pounds	47,159,238	3,090,090	50,228,706	3,351,868	58,040,202	3,858,001
Palm kernel......do	25,932,855	2,073,721	23,569,031	1,868,658	34,327,600	3,087,343
Soya bean......do	28,021,282	1,577,131	12,340,185	635,888	16,360,452	830,790
Other	....	355,767	....	381,801	....	439,009
Total fixed or expressed	....	23,242,463	....	23,190,513	....	28,828,773
Volatile or essential—						
Lemon......pounds	357,174	451,588	381,093	744,658	385,959	858,220
Other	....	3,140,692	....	4,194,827	....	2,633,789
Total volatile or essential	....	3,592,280	....	4,939,485	....	3,492,009
Total vegetable oils	....	26,834,743	....	28,129,998	....	32,320,782
Opium, crude......pounds	399,837	2,437,403	508,433	2,565,965	455,200	1,810,429
Rice, rice meal, etc.:						
Rice—						
Cleaned......pounds	25,008,414	848,469	32,715,479	1,203,005	95,503,998	3,017,108
Uncleaned, including paddy......pounds	48,478,264	1,618,379	51,779,326	1,900,081	54,784,051	1,917,658
Rice flour, rice meal, and broken rice..pounds	116,576,653	1,968,177	137,608,742	2,813,778	139,906,868	2,538,941
Total rice, etc......do	190,063,331	4,435,025	222,103,547	5,916,864	290,194,917	7,473,707
Sago, tapioca, etc	....	1,674,725	....	2,187,217	....	1,641,640
Seeds:						
Castor beans or seeds.bushels	957,986	1,080,535	887,747	985,598	1,030,543	1,139,311
Clover—						
Red......pounds	38,551,137	6,099,136	6,072,842	987,702	6,764,218	835,091
Other......do			15,151,715	1,608,011	23,343,431	2,047,941
Flaxseed or linseed.bushels	6,841,806	12,995,250	5,294,296	8,127,774	8,653,235	10,571,419
Grass seed, n. e. s...pounds	24,072,821	1,400,077	25,452,076	1,637,244	31,037,701	1,634,627
Sugar beet......do	11,389,394	1,103,357	14,768,207	1,064,392	10,293,898	799,525
Other	....	2,962,817	....	3,114,812	....	3,055,679
Total seeds	....	25,641,172	....	17,425,533	....	20,084,184
Spices:						
Unground—						
Cassia, or cassia vera, pounds	6,795,943	514,758	6,853,915	535,974	6,771,901	404,853
Ginger root, not preserved, pounds	5,979,314	368,175	7,756,090	399,270	3,771,086	171,250
Pepper, black or white, pounds	25,802,252	2,599,479	27,562,361	2,852,665	24,173,621	2,427,927
Other......pounds	14,651,846	1,464,239	16,062,861	1,576,462	2,896,823	309,184
Total unground, pounds	53,229,355	4,946,651	58,235,227	5,364,371	37,613,431	3,313,214
Ground......pounds	9,887,193	1,027,519	6,990,174	822,765	18,961,068	2,282,295
Total spices......do	63,116,548	5,974,170	65,225,401	6,187,136	56,574,499	5,595,509

[1] Included in "Other," fixed or expressed.

TABLE 180.—*Agricultural imports of the United States during the 3 years ending June 30, 1914*—Continued.

Article imported.	Year ending June 30— 1912 Quantity.	1912 Value.	1913 Quantity.	1913 Value.	1914 Quantity.	1914 Value.
VEGETABLE MATTER—contd.						
Spirits, distilled. (*See* Liquors, alcoholic.)						
Starch ... pounds..	15,841,437	$478,465	16,710,498	$457,784	15,518,434	$408,922
Straw and grass ... long tons..	10,172	56,702	3,553	19,079	6,060	33,499
Sugar and molasses:						
Molasses ... gallons..	28,828,213	1,197,878	33,926,521	1,456,350	51,410,271	1,744,719
Sugar—						
Raw—						
Beet ... pounds..	6,504,260	239,484	182,647,582	4,169,523	2,367,708	70,829
Cane ... do....	4,092,129,718	114,958,470	4,554,049,872	99,293,354	5,061,564,621	101,365,561
Maple sugar and sirup, pounds ...	(1)	(1)	(1)	(1)	2,095,983	163,047
Total raw ... pounds..	4,098,633,978	115,197,954	4,736,697,454	103,462,877	5,066,028,312	101,599,437
Refined ... do....	5,984,415	317,125	3,344,034	176,946	793,561	49,938
Total sugar ... do....	4,104,618,393	115,515,079	4,740,041,488	103,639,823	5,066,821,873	101,649,375
Total sugar and molasses ...	...	116,712,957	...	105,096,173	...	103,394,094
Tea ... pounds..	101,406,816	18,207,141	94,812,800	17,433,688	91,130,815	16,735,302
Tea, waste, etc., for manufacturing ... pounds..	5,994,547	161,532	7,053,550	211,541	5,874,308	194,293
Teazels ...	...	16,998	...	27,155	...	24,310
Tobacco:						
Leaf—						
Wrapper ... pounds..	6,474,881	8,104,907	6,398,782	8,242,212	6,092,787	7,785,387
Filler and other leaf. do....	46,536,954	23,814,407	61,133,963	27,691,361	54,047,436	27,247,259
Stems ... do....	1,728,545	6,270	444,373	4,938	1,034,528	5,874
Total tobacco ... do....	54,740,380	31,925,584	67,977,118	35,938,511	61,174,751	35,038,520
Vanilla beans ... do....	841,628	2,025,153	1,049,497	2,641,573	898,100	2,277,675
Vegetables:						
Fresh and dried—						
Beans ... bushels..	1,004,930	1,857,220	1,048,297	1,938,105	1,634,070	2,955,663
Onions ... do....	1,436,037	1,234,316	789,458	481,756	1,114,811	909,204
Peas, dried ... do....	806,762	1,515,516	1,134,346	1,835,775	866,488	1,849,274
Potatoes ... do....	13,734,695	7,168,627	327,230	303,214	3,645,993	1,763,782
Other ...	...	1,726,145	...	1,410,354	...	1,630,113
Total fresh and dried ...	...	13,501,824	...	5,969,204	...	9,108,036
Prepared or preserved—						
Mushrooms ... pounds..	7,406,927	1,013,082	8,123,373	1,172,376	9,188,177	1,306,818
Pickles and sauces ...	...	1,086,851	...	1,123,108	...	1,246,249
Other ...	...	2,943,116	...	3,094,073	...	3,472,432
Total prepared or preserved ...	...	5,043,049	...	5,389,557	...	6,025,499
Total vegetables ...	...	18,544,873	...	11,358,761	...	15,133,535
Vinegar ... gallons..	360,524	81,899	295,939	85,090	311,643	94,597
Wafers, unmedicated ...	...	29,593	...	28,491	...	32,797
Wax, vegetable ... pounds..	4,665,828	1,080,200	5,652,995	1,146,077	4,255,666	1,049,126
Wines. (*See* Liquors, alcoholic.)						
Total vegetable matter, *including forest products.* [2] ...	...	711,943,405	...	712,096,265	...	720,778,232
Total vegetable matter, excluding forest products ...	...	539,419,940	...	531,593,821	...	565,[illegible],932
Total agricultural imports, including forest products ...	...	955,980,936	...	995,808,954	...	1,079,807,918
Total agricultural imports, excluding forest products		[illegible]		[illegible]		[illegible]

TABLE 181.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1914.*

Article exported.	Year ending June 30— 1912 Quantity.	1912 Value.	1913 Quantity.	1913 Value.	1914 Quantity.	1914 Value.
ANIMAL MATTER.						
Animals, live:						
Cattle..........number..	105,506	$8,870,075	24,714	$1,177,199	18,376	$647,288
Horses..........do....	34,828	4,764,815	28,707	3,960,102	22,770	3,388,819
Mules..........do....	4,961	732,095	4,744	733,795	4,883	690,974
Sheep..........do....	157,263	626,985	187,132	605,725	152,600	534,543
Swine..........do....	19,038	159,370	16,332	151,747	10,122	133,751
Other (including fowls).....	...	294,647	...	451,554	...	408,284
Total live animals.......	...	15,447,987	...	7,080,122	...	5,803,659
Beeswax..........pounds..	109,478	32,556	116,296	33,131	96,215	27,292
Dairy products:						
Butter..........do....	6,092,235	1,468,432	3,585,600	872,804	3,693,597	877,453
Cheese..........do....	6,337,560	898,035	2,599,058	441,186	2,427,577	414,124
Milk—						
Condensed..........do....	20,642,738	1,651,879	16,525,918	1,432,848	16,209,082	1,341,140
Other, including cream....	...	244,913	...	474,055	...	333,217
Total dairy products, pounds..........	...	4,263,259	...	3,220,893	...	2,965,934
Eggs..........dozens..	15,405,609	3,395,952	20,409,390	4,391,653	16,148,849	3,734,087
Egg yolks..........	...	29,541	...	67,854	...	47,968
Feathers..........	...	369,693	...	690,612	...	640,020
Fibers, animals:						
Silk waste..........pounds..	71,132	16,080	37,547	9,704	27,597	8,178
Wool..........do....	(1)	(1)	77,047	22,625	335,348	124,127
Total animal fibers, pounds..........	71,132	16,080	114,594	32,329	362,945	132,305
Glue..........pounds..	3,059,952	314,909	2,544,942	276,619	2,351,773	258,011
Honey..........	...	212,652	...	182,252	...	135,609
Packing-house products:						
Beef—						
Canned..........pounds..	11,026,431	1,303,404	6,840,348	857,826	3,464,733	461,901
Cured or pickled....do....	38,087,907	2,832,109	25,856,919	2,489,965	23,265,974	2,289,516
Fresh..........do....	15,264,320	1,596,319	7,362,388	902,149	6,394,404	788,793
Oils—Oleo oil..........do....	126,467,124	13,434,018	92,849,757	10,866,253	97,017,065	10,156,665
Oleomargarine..........do....	3,627,425	372,567	2,987,582	311,485	2,532,821	263,453
Tallow..........do....	39,451,419	2,388,046	30,586,300	1,910,439	15,812,831	1,002,011
Total beef..........do....	233,924,626	21,926,463	166,483,294	17,338,117	148,487,828	14,962,339
Bones, hoofs, horns, and horn tips, strips and waste..........	...	162,009	...	[2] 77,576	...	47,651
Grease, grease scraps, and all soap stock—						
Lubricating..........	...	2,193,363	...	2,339,015	...	2,394,918
Soap stock..........	...	4,486,329	...	4,844,342	...	5,046,959
Hair..........	...	[3] 1,426,111	...	1,449,157	...	1,085,038
Hides and skins, other than furs—						
Calfskins..........pounds..	548,242	99,592	923,922	155,499	323,417	69,515
Cattle hides..........do....	17,445,209	2,289,648	17,971,809	2,589,603	12,524,901	1,933,705
Horse..........do....	(4)	(4)	5,472,832	456,879	5,742,855	610,456
Other..........do....	7,253,349	769,255	1,791,775	247,943	1,275,962	193,577
Total..........do....	25,246,800	3,158,495	26,160,338	3,449,924	19,867,135	2,807,253

[1] Not stated.
[2] Bones, including manufactures of.
[3] Including manufactures of.
[4] Included in "Other" hides and skins other than furs.

TABLE 181.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1914*—Continued.

Article exported.	Year ending June 30— 1912 Quantity.	1912 Value.	1913 Quantity.	1913 Value.	1914 Quantity.	1914 Value.
ANIMAL MATTER—continued.						
Packing-house products—Con.						
Hoofs, horns, and horn tips, strips, and waste	....	(1)	....	$102,705	....	$01,180
Lard compounds ..pounds..	62,522,888	$5,183,689	67,456,832	5,915,759	58,303,564	5,489,139
Meat, canned, n. e. s.	....	1,298,152	....	1,086,463	....	1,350,218
Mutton ....pounds..	3,595,543	349,875	5,266,019	591,969	4,685,496	523,023
Oils, animal, n. e. s. gallons..	1,019,412	754,342	1,603,325	970,717	891,035	609,294
Pork—						
Canned ....pounds..	5,839,902	681,127	4,148,343	565,039	3,074,303	492,822
Cured—						
Bacon ....do....	208,574,208	24,907,197	200,993,584	25,647,167	193,964,252	25,879,056
Hams and shoulders, pounds	204,044,491	24,983,376	159,544,687	21,641,386	165,881,791	23,767,447
Salted or pickled, pounds	56,321,469	5,348,594	53,749,023	5,699,136	45,543,085	4,896,574
Total cured...do....	*468,940,168*	*55,239,167*	*414,287,294*	*52,987,689*	*405,389,128*	*54,543,077*
Fresh ....do....	2,597,880	297,198	2,457,997	310,574	2,668,020	359,181
Lard ....do....	*532,255,865*	*52,090,441*	*519,025,384*	*58,187,336*	*481,457,792*	*54,402,911*
Lard, neutral ......do....	62,317,909	6,655,009	44,777,692	5,129,899	29,323,786	3,270,236
Oils—Lard oil....gallons..	207,337	147,766	154,983	113,665	111,199	87,364
Total pork	....	115,110,708	....	117,294,202	....	113,155,591
Sausage and sausage meats—						
Canned ....pounds..	8,036,591	1,045,834	1,117,400	145,440	1,446,582	202,120
Other ....do....			6,893,918	940,305	4,562,983	755,794
Sausage casings ....do....	36,496,326	5,034,714	26,203,391	3,901,428	30,092,206	4,077,882
Stearin ....do....	....	(2)	*3,744,886*	*323,376*	*2,724,181*	*234,121*
All other	....	1,497,993	....	1,935,860	....	1,685,351
Total packing-house products	....	163,628,077	....	162,706,355	....	154,487,871
Poultry and game	....	697,955	....	1,303,379	....	913,632
Silk waste. (*See* Fibers, animal.)						
Wool. (*See* Fibers, animal.)						
Total animal matter....	....	188,408,661	....	179,985,190	....	169,147,048
VEGETABLE MATTER.						
Breadstuffs. (*See* Grain and grain products.)						
Broom corn ....long tons..	3,320	461,110	4,113	389,219	2,959	327,426
Cider ....gallons..	63,882	10,480	(3)	(3)	(3)	(3)
Cocoa, ground or prepared, and chocolate	....	514,266	....	376,336	....	336,940
Coffee:						
Green or raw ......pounds..	40,779,693	6,864,668	50,723,958	8,679,422	52,649,233	8,550,642
Roasted or prepared..do....	1,468,767	306,090	1,459,043	331,370	1,816,835	427,009
Total coffee......do....	42,248,460	7,170,758	52,183,001	9,010,792	54,465,068	8,977,651
Cotton:						
Sea Island ....bales....	26,872	2,460,130	11,343	1,078,274	19,186	1,619,847
Sea Island ....pounds..	10,693,038		4,412,470		7,420,455	
Upland ....bales....	10,648,573	563,389,141	8,712,729	546,278,921	9,146,114	608,855,454
Upland ....pounds..	5,524,432,391		4,557,883,205		4,758,520,083	
Total cotton......do....	5,535,125,429	565,849,271	4,562,295,675	547,357,195	4,760,940,538	610,475,801
Flavoring extracts and fruit juices	....	173,402	....	128,990	....	108,802
Flowers, cut	....	38,338	....	101,896	....	121,287

TABLE 181.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1914*—Continued.

Article exported.	Year ending June 30—					
	1912		1913		1914	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—contd.						
Forest products:						
Bark, and extract of, for tanning—						
Bark .... pounds..	4,188,945	$57,319	[1] 1,683	$46,499	[1] 1,212	$26,939
Bark, extracts of	....	404,024	....	524,063	....	639,941
Total bark, etc.	....	461,343	....	570,562	....	666,880
Charcoal	....	45,726	....	73,030	....	81,997
Moss	....	24,524	....	69,609	....	51,006
Naval stores—						
Rosin .... barrels..	2,474,460	16,462,850	2,806,046	17,359,145	2,417,950	11,217,316
Tar, turpentine and pitch, barrels	50,107	223,002	62,346	317,491	351,353	568,891
Turpentine, spirits of, gallons	19,599,241	10,069,135	21,039,597	8,794,656	18,900,704	8,095,958
Total naval stores...	....	26,754,987	....	26,471,292	....	19,882,165
Wood—						
Logs—						
Hickory .... M feet..	7,974	271,722	8,293	309,896	8,425	297,613
Oak .... do....	5,039	200,072	3,139	125,818	1,872	63,850
Walnut .... do....	9,816	612,067	12,711	692,665	6,951	382,059
Other .... do....	136,958	2,574,312	149,381	3,095,029	120,819	2,512,501
Total .... do....	159,787	3,658,173	173,524	4,223,408	138,067	3,256,023
Lumber—						
Boards, deals, and planks—						
Cypress .... M feet..	(2)	(2)	14,788	455,649	14,098	420,982
Fir .... do....	629,220	7,640,038	665,295	8,650,747	680,380	8,709,140
Gum .... do....	59,415	1,645,031	84,520	2,580,286	70,714	2,164,017
Oak .... do....	222,266	9,529,413	287,855	13,377,912	231,308	10,644,310
Pine—						
White .... do....	(3)	(3)	49,283	1,661,396	43,878	1,606,864
Yellow—						
Pitch pine.. do....	779,375	15,852,231	869,737	18,596,796	911,223	19,521,719
Short-leaf pine, M feet	42,005	824,360	47,517	1,086,503	22,453	634,103
Other pine, M feet	270,918	6,560,680	228,365	5,211,158	127,289	3,001,399
Poplar .... M feet..	23,105	985,291	37,652	1,719,274	30,860	1,443,622
Redwood .... do....	(2)	(2)	51,903	1,355,340	67,155	1,917,315
Spruce .... do....	17,424	510,047	20,020	619,837	18,105	557,838
Other .... do....	262,952	7,493,538	193,373	6,661,021	187,823	6,948,239
Total .... do....	2,306,680	51,060,644	2,550,308	61,975,919	2,405,296	57,574.548
Joists and scantling, M feet	34,229	577,075	25,925	479,909	12,143	206,919
Railroad ties .. number..	(4)	(4)	5,416,713	2,616,563	5,123,004	2,564,543
Shingles .... M..	94,732	222,243	106,903	261,058	46,964	112,463
Shooks—						
Box .... number..	10,225,688	1,070,286	13,389,638	1,366,649	11,149,532	1,270,477
Other .... do....	1,161,591	1,888,467	1,710,095	3,037,943	867,805	1,542,272
Total shooks .. do....	11,387,279	2,958,753	15,099,733	4,404,592	12,017,337	2,812,749

TABLE 181.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1914*—Continued.

Article exported.	Year ending June 30— 1912 Quantity.	1912 Value.	1913 Quantity.	1913 Value.	1914 Quantity.	1914 Value.
VEGETABLE MATTER—contd.						
Forest products—Continued.						
Wood—Continued.						
Lumber—Continued.						
Staves and heading—						
Heading		$318,092		$346,258		$332,662
Staves ... number	64,162,599	5,748,394	89,005,624	7,325,535	77,150,535	5,852,230
Total staves and heading		6,066,486		7,671,793		6,184,892
Other		4,014,669		3,087,005		3,028,642
Total lumber		64,899,870		80,496,899		72,484,756
Timber—						
Hewn ... M feet	31,067	644,129	34,502	933,887	29,859	788,327
Sawed—						
Pitch pine ... do	287,652	5,612,768	447,420	9,516,618	390,149	7,821,364
Other ... do	119,302	4,679,924	29,715	700,072	21,158	562,720
Total timber ... do	438,021	10,936,821	511,637	11,150,577	441,166	9,172,411
All other, including firewood		256,249		228,244		201,089
Total wood		79,751,113		96,099,128		85,114,279
Wood alcohol ... gallons	1,565,368	685,565	1,837,173	788,143	1,598,776	652,486
Wood pulp ... pounds	19,888,961	388,996	41,475,557	784,020	26,961,254	529,741
Total forest products		108,122,254		124,835,784		106,978,554
Fruits:						
Fresh or dried—						
Apples, dried ... pounds	53,664,639	4,545,971	41,574,562	2,898,211	33,566,160	2,628,445
Apples, fresh ... barrels	1,456,381	5,409,946	2,150,132	7,898,634	1,506,569	6,089,701
Apricots, dried ... pounds	13,413,430	1,885,855	35,016,730	3,513,473	17,401,692	1,937,771
Berries		(1)		574,449		717,079
Lemons ... boxes		(1)	81,949	399,409	70,075	308,707
Oranges ... do	*1,197,363*	*3,022,859*	*1,063,233*	2,976,520	*1,558,921*	3,824,889
Peaches, dried ... pounds	4,425,803	422,766	6,529,633	444,879	6,712,296	449,549
Pears, fresh		784,627		796,913		1,402,924
Prunes ... pounds	74,328,074	4,969,053	117,950,875	6,655,870	69,813,711	4,662,546
Raisins ... do	19,949,046	1,351,986	28,120,507	1,512,642	14,766,416	997,575
Other		3,812,304		2,893,395		2,922,740
Total fresh or dried		26,205,367		30,564,395		25,941,926
Preserved—						
Canned		4,012,463		5,599,373		4,863,946
Other		136,870		181,749		224,841
Total preserved		4,149,333		5,781,122		5,088,787
Total fruits		30,354,700		36,345,517		31,030,713
Ginseng ... pounds	155,308	1,119,301	221,901	1,665,731	224,605	1,832,686
Glucose and grape sugar:						
Glucose ... pounds	126,395,045	2,911,736	158,365,604	3,682,371	162,680,378	3,766,284
Grape sugar ... do	44,761,214	1,005,161	41,783,642	970,025	36,850,496	799,635
Grain and grain products:						
Grain—						
Barley ... bushels	1,585,242	1,267,999	17,536,703	11,411,819	6,644,747	4,253,129
Buckwheat ... do	*189*	*147*	*1,347*	*1,563*	*580*	*685*
Corn ... do	40,038,795	25,957,450	49,064,967	28,800,544	9,380,855	7,008,028
Oats ... do	2,171,503	1,135,635	33,759,177	13,206,247	1,859,949	757,537
Rye ... do	5,548	4,844	1,822,962	1,290,384	2,222,934	1,655,012
Wheat ... do	30,160,212	28,477,584	91,602,974	89,036,428	92,393,775	87,953,456
Total grain ... do	73,961,489	59,843,659	195,788,130	143,716,925	112,502,840	101,627,847

[1] Included in "Other," fresh or dried frui

TABLE 181.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1914*—Continued.

Article exported.	Year ending June 30—					
	1912		1913		1914	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—contd.						
Grain and grain products—Con.						
Grain products—						
Bran, middlings, and mill feed..........long tons..	144,504	$4,226,173	[1] 6,179	[1] $170,733	[1] 2,570	[1] $71,043
Breadstuff preparations—						
Bread and biscuit, pounds..........	12,973,048	727,280	12,532,480	720,067	12,645,551	728,447
Other..........	....	2,063,876	....	2,358,864	....	2,323,412
Total breadstuff preparations..........	....	2,791,156	....	3,078,931	....	3,051,859
Distillers' and brewers' grains and malt sprouts, long tons..........	73,628	1,901,974	79,160	2,061,540	59,788	1,467,028
Malt..........bushels..	76,696	86,323	370,957	300,489	330,608	270,059
Meal and flour—						
Corn meal......barrels..	439,624	1,519,792	428,794	1,444,539	336,241	1,185,891
Oatmeal.......pounds..	9,112,433	376,188	48,533,350	1,514,848	15,998,286	569,204
Rye flour.......barrels..	4,306	17,029	5,296	21,311	8,293	31,119
Wheat flour.......do....	11,006,487	50,999,797	11,394,805	53,171,537	11,821,461	54,454,175
Total meal and flour...	....	52,912,806	....	56,152,235	....	56,240,389
Mill feed.......long tons..	(2)	(2)	156,142	4,180,133	67,690	1,840,011
All other..........	....	1,333,560	....	862,735	....	346,888
Total grain products....	....	63,251,992	....	66,806,796	....	63,287,277
Total grain and grain products..........	....	123,095,651	....	210,523,721	....	164,815,124
Hay..........long tons..	59,730	1,039,040	60,720	964,429	50,151	827,295
Hops..........pounds..	12,190,603	4,648,505	17,591,195	4,764,713	24,262,896	6,953,529
Lard compounds. (*See* Meat and meat products.)						
Liquors, alcoholic:						
Distilled spirits—						
Alcohol, including cologne spirits....proof gallons..	25,440	11,336	151,232	58,346	187,845	67,728
Rum..........do....	1,410,840	1,827,237	1,268,054	1,667,567	1,388,738	1,815,121
Whisky—						
Bourbon..........do....	84,381	124,946	60,252	119,429	47,775	92,331
Rye..........do....	140,122	267,688	177,341	327,950	134,152	259,523
Total whisky...do....	224,503	392,634	237,593	447,379	181,927	351,854
Other..........do....	23,797	43,123	29,271	44,867	25,408	41,129

TABLE 181.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1914*—Continued.

Article exported.	Year ending June 30—					
	1912		1913		1914	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—contd.						
Malt. (*See* Grain and grain products.)						
Malt liquors. (*See* Liquors, alcoholic.)						
Malt sprouts. (*See* Grain and grain products.)						
Nursery stock		$413,255		$459,769		$315,065
Nuts:						
Peanuts .... pounds	5,920,711	305,465	7,301,381	366,016	8,054,817	421,367
Other		303,473		367,569		398,312
Total nuts		608,938		733,585		819,679
Oil cake and oil-cake meal:						
Corn .... pounds	72,490,021	1,035,291	76,262,845	1,131,330	59,030,623	909,407
Cottonseed .... do	1,293,690,138	17,325,858	1,128,092,367	15,225,798	799,974,252	11,007,441
Flaxseed, or linseed .... do	596,114,536	9,735,022	838,119,654	12,982,423	662,868,639	9,650,379
Other .... do	8,924,033	132,534	6,886,270	104,701	8,484,936	100,445
Total .... do	1,971,218,728	28,228,705	2,049,361,136	29,444,252	1,530,358,450	21,667,672
Oils, vegetable:						
Fixed or expressed—						
Corn .... pounds	23,866,146	1,526,931	19,839,222	1,292,009	18,281,576	1,307,204
Cottonseed .... do	399,470,973	24,089,223	315,282,892	20,736,972	192,963,079	13,843,179
Linseed .... gallons	246,965	208,591	1,733,925	874,461	239,188	134,540
Other		339,391		420,368		338,956
Total fixed or expressed		26,164,136		23,323,810		15,623,879
Volatile, or essential—						
Peppermint .... pounds	155,740	422,631	134,863	395,551	117,809	397,050
Other		322,164		325,040		230,557
Total volatile, or essential		744,795		720,591		627,607
Total vegetable oils		26,908,931		24,044,401		16,251,486
Rice, rice meal, etc.:						
Rice .... pounds	26,797,535	851,402	24,801,280	765,447	18,223,384	721,046
Rice bran, meal, and polish, pounds	12,649,036	118,985	14,106,777	109,660	4,191,062	36,274
Rice hulls		181,229		194,757		126,888
Total		1,151,616		1,069,864		884,208
Roots, herbs, and barks, n. e. s.		549,877		424,312		513,071
Seeds:						
Cotton seed .... pounds	64,060,776	727,100	24,046,647	328,968	16,342,384	215,115
Flaxseed, or linseed, bushels	4,323	12,160	16,894	26,690	305,546	436,874
Grass and clover seed—						
Clover .... pounds	1,874,682	317,772	5,407,594	941,622	4,640,852	691,437
Timothy .... do	4,354,556	620,942	17,559,653	844,418	12,480,294	688,118
Other .... do	(1)	534,578	8,226,512	895,276	5,156,801	600,368
Total grass and clover seed .... pounds	(1)	1,473,292	31,193,759	2,681,316	22,277,947	1,979,923
All other seeds		686,250		527,834		558,833
Total seeds		2,898,802		3,564,837		3,190,745
Spices		74,023		92,962		84,427
Spirits, distilled. (*See* Liquors, alcoholic.)						
Starch .... pounds	88,644,749	1,965,401	110,897,591	2,609,716	76,718,779	1,825,230
Straw .... long tons	1,080	11,559	634	5,682	268	4,714

TABLE 181.—*Agricultural exports (domestic) of the United States during the 3 years ending June 30, 1914*—Continued.

Article exported.	Year ending June 30					
	1912		1913		1914	
	Quan.ity.	Value.	Quantity.	Value.	Quantity.	Value.
VEGETABLE MATTER—contd.						
Sugar, molasses, and sirup:						
Molasses..........gallons..	9,513,441	$984,636	2,145,613	$255,973	1,002,441	$175,498
Sirup................do....	19,146,986	2,539,055	14,309,029	1,937,648	11,630,528	1,491,639
Sugar—						
Refined.........pounds..	79,594,034	3,681,072	43,994,761	1,681,302	50,895,726	1,839,983
Total sugar, molasses, and sirup............	....	7,204,763	....	3,874,923	....	3,507,120
Tobacco:						
Leaf..............pounds..	375,373,131	43,146,013	414,160,356	49,202,456	446,944,435	53,903,336
Stems and trimmings.do....	4,472,189	105,844	4,636,550	151,139	2,805,547	60,334
Total............do....	379,845,320	43,251,857	418,796,906	49,353,595	449,749,982	53,963,670
Vegetables:						
Fresh or dried—						
Beans and peas..bushels..	341,268	1,011,466	400,868	1,080,066	314,655	875,493
Onions.............do....	313,299	307,132	571,074	397,516	386,322	435,953
Potatoes..........do....	1,237,276	1,414,297	2,028,261	1,646,176	1,794,073	1,463,514
Total fresh or dried, bushels..............	1,891,843	2,732,895	3,000,203	3,123,758	2,495,050	2,774,960
Prepared or preserved—						
Canned..................	....	1,822,357	....	1,819,281	....	1,520,879
Pickles and sauces........	....	(1)	....	837,571	....	928,611
Other....................	....	1,988,866	....	1,572,927	....	1,711,950
Total prepared or preserved..............	....	3,811,223	....	4,229,779	....	4,161,440
Total vegetables........	....	6,544,118	....	7,353,537	....	6,936,400
Vinegar..............gallons..	185,580	37,770	213,786	63,836	125,666	25,112
Wines. (*See* Liquors, alcoholic.)						
st........................	....	175,347	....	278,200	....	332,895
Total vegetable matter, including forest products..................	....	970,340,724	....	1,068,502,570	....	1,051,805,141
Total vegetable matter, excluding forest products..................	....	862,218,470	....	943,666,786	....	944,826,587
Total agricultural exports, including forest products............	....	1,158,749,385	....	1,248,487,769	....	1,220,952,189
Total agricultural exports, excluding forest products............	....	1,050,627,131	....	1,123,651,985	....	1,113,973,635

[1] Included in "Other," prepared or preserved vege

TABLE 182.—*Foreign trade of the United States in agricultural products, 1852–1914.*

[Compiled from reports of Foreign Commerce and Navigation of the United States. All values are gold.]

Year ending June 30—	Agricultural exports.[1]			Agricultural imports.[1]		Excess of agricultural exports (+) or of imports (−).
	Domestic.		Foreign.	Total.	Percentage of all imports.	
	Total.	Percentage of all domestic exports.				
Average:						
1852–1856	*$164,895,148*	*80.9*	*$8,059,875*	*$77,847,158*	*29.1*	*+$95,107,863*
1857–1861	215,708,845	81.1	10,173,833	121,018,143	38.2	+104,864,535
1862–1866	148,865,540	75.7	9,287,660	122,221,547	43.0	+ 35,931,662
1867–1871	250,713,058	76.9	8,538,101	179,774,000	42.3	+ 79,477,159
1872–1876	396,666,397	78.5	8,853,247	263,155,573	46.5	+142,364,071
1877–1881	591,350,518	80.4	8,631,780	266,383,702	50.4	+333,598,596
1882–1886	557,472,922	76.3	9,340,463	311,707,564	46.8	+255,105,821
1887–1891	573,286,616	74.7	6,982,328	366,950,109	43.3	+213,318,835
1892–1896	638,748,318	73.0	8,446,491	398,332,043	51.6	+248,862,766
1897–1901	*827,566,147*	*65.9*	*10,961,539*	*376,549,697*	*50.2*	*+461,977,989*
1902–1906	879,541,247	59.5	11,922,292	487,881,038	46.3	+403,582,501
1907–1911	975,398,554	53.9	12,126,228	634,570,734	45.2	+352,954,048
1901	951,628,331	65.2	11,293,045	391,931,051	47.6	+570,990,325
1902	857,113,533	63.2	10,308,306	413,744,557	45.8	+453,677,282
1903	878,480,557	63.1	13,505,343	456,199,325	44.5	+435,786,575
1904	859,160,264	59.9	12,625,026	461,434,851	46.6	+410,350,439
1905	826,904,777	55.4	12,316,525	553,851,214	49.6	+285,370,088
1906	976,047,104	56.8	10,856,259	554,175,242	45.2	+432,728,121
1907	1,054,405,416	58.9	11,613,519	626,836,808	43.7	+439,182,127
1908	1,017,396,404	55.5	10,298,514	539,690,121	45.2	+488,004,797
1909	903,238,122	55.1	9,584,934	638,612,692	48.7	+274,210,364
1910	871,158,425	50.9	14,469,627	687,509,115	44.2	+198,118,937
1911	1,030,794,402	51.2	14,664,548	680,204,932	44.5	+365,254,018
1912	1,050,627,131	48.4	12,107,656	783,457,471	47.4	+279,277,316
1913	1,123,651,985	46.3	15,029,444	815,300,510	45.0	+323,380,919
1914	1,113,973,635	47.8	17,729,462	924,246,616	48.8	+207,456,481

[1] Not including forest products.

TABLE 183.—*Exports of selected domestic agricultural products, 1852–1914.*

[Compiled from reports of Foreign Commerce and Navigation of the United States. Where figures are lacking, either there were no exports or they were not separately classified for publication. For "Beef, salted or pickled," and "Pork, salted or pickled," barrels, 1851–1865, were reduced to pounds at the rate of 200 pounds per barrel, and tierces, 1855–1865, at the rate of 300 pounds per tierce; cottonseed oil, 1910, pounds reduced to gallons at the rate of 7.5 pounds per gallon. It is assumed that 1 barrel of corn meal is the product of 4 bushels of corn, and 1 barrel of wheat flour the product of 5 bushels of wheat prior to 1880 and of 4½ bushels of wheat in 1880 and subsequently.]

Year ending June 30—	Cattle.	Cheese.	Packing-house products.				
			Beef, cured—salted or pickled.	Beef, fresh.	Beef oils—oleo oil.	Beef (mostly)—tallow.	Beef and its products—total, as far as ascertainable in pounds.[1]
Average:	*Number.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1852–1856..	1,431	6,200,385	25,980,520	....	....	7,468,910	33,449,430
1857–1861..	20,294	13,906,430	26,985,880	....	....	13,214,614	40,200,494
1862–1866..	6,531	42,683,073	27,662,720	....	....	43,202,724	70,865,444
1867–1871..	....	52,880,978	26,954,656	....	....	27,577,269	54,531,925
1872–1876..	45,672	87,173,752	35,826,646	....	....	78,994,360	114,821,006
1877–1881..	127,045	129,670,479	40,174,643	69,601,120	....	96,822,695	218,709,987
1882–1886..	131,605	108,790,010	47,401,470	97,327,819	30,276,133	48,745,416	225,625,631
1887–1891..	244,394	86,354,842	65,613,851	136,447,554	50,482,249	91,608,126	411,797,859
1892–1896..	349,032	66,905,798	64,898,780	207,372,575	102,038,519	56,976,840	507,177,430
1897–1901..	415,488	46,108,704	52,242,288	305,626,184	139,373,402	86,082,497	637,268,235
1902–1906..	508,103	19,244,482	59,208,292	272,148,180	156,925,317	59,892,601	622,843,230
1907–1911..	253,867	9,152,083	46,187,175	144,799,735	170,530,432	66,356,232	448,024,017
1901........	459,218	39,813,517	55,312,632	351,748,333	161,651,413	77,166,889	705,104,772
1902........	392,884	27,203,184	48,632,727	301,824,473	138,546,088	34,065,758	596,254,520
1903........	402,178	18,987,178	52,801,220	254,795,963	126,010,339	27,368,924	546,055,244
1904........	593,409	23,335,172	57,584,710	299,579,671	165,183,839	76,924,174	663,147,095
1905........	567,806	10,134,424	55,934,705	236,486,568	145,228,245	63,536,992	575,874,718
1906........	584,239	16,562,451	81,088,098	268,054,227	209,658,075	97,567,156	732,884,572
1907........	423,051	17,285,230	62,645,281	281,651,502	195,337,176	127,857,739	689,752,420
1908........	349,210	8,439,031	46,958,367	201,154,105	212,541,157	91,397,507	579,303,478
1909........	207,542	6,822,842	44,494,210	122,952,671	179,985,246	53,332,767	418,844,332
1910........	139,430	2,846,709	36,554,266	75,729,666	126,091,675	29,379,992	286,295,874
1911........	*150,100*	*10,366,605*	*40,283,749*	*42,510,731*	*138,696,906*	*29,813,154*	*265,922,983*
1912........	105,506	6,337,559	38,087,907	15,264,320	126,407,124	39,451,419	233,924,626
1913........	24,714	2,599,058	25,856,919	7,362,388	92,849,757	30,586,350	166,463,344
1914........	18,376	2,427,577	23,265,974	6,394,404	97,017,065	15,812,831	148,487,828

Year ending June 30—	Packing-house products.					Apples, fresh.	Corn and corn meal (converted to corn).
	Pork, cured—bacon.	Pork, cured—hams.[2]	Pork, cured—salted or pickled.	Pork—lard.	Pork and its products—total, as far as ascertainable in pounds.[3]		
Average:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Barrels.*	*Bushels.*
1852–1856..	30,005,479	....	40,542,600	33,354,976	103,903,056	37,412	7,123,286
1857–1861..	30,583,297	....	34,854,400	37,965,993	103,403,690	57,045	6,557,610
1862–1866..	10,796,961	....	52,550,758	89,138,251	252,485,970	119,433	12,059,794
1867–1871..	45,790,113	....	23,879,085	53,579,373	125,248,571	....	9,924,235
1872–1876..	313,402,401	....	60,429,361	194,197,714	568,029,477	132,756	38,560,557
1877–1881..	643,633,709	....	85,968,138	331,457,591	1,075,793,475	509,735	88,190,030
1882–1886..	355,905,444	47,634,675	72,354,682	263,425,058	739,455,913	401,886	49,992,203
1887–1891..	419,935,416	60,697,365	73,984,682	381,388,854	936,247,966	522,511	54,606,273
1892–1896..	438,847,549	96,107,152	64,827,470	451,547,135	1,052,133,760	520,810	63,979,898
1897–1901..	536,287,266	200,853,226	112,788,498	652,418,143	1,528,138,779	779,980	192,531,378
1902–1906..	293,721,953	206,902,427	116,823,284	592,130,894	1,242,136,649	1,368,608	74,615,465
1907–1911..	209,005,144	189,603,211	90,809,879	519,746,378	1,028,996,659	1,225,655	56,568,030
1901........	456,122,741	216,571,803	138,643,611	611,357,514	1,462,369,849	883,673	181,405,473
1902........	383,150,624	227,653,232	115,896,275	556,840,222	1,337,315,909	459,719	28,028,688
1903........	207,336,000	214,183,365	95,287,374	490,755,821	1,042,119,570	1,656,129	76,639,261
1904........	249,665,941	194,948,864	112,224,861	561,302,643	1,146,255,441	2,018,262	58,222,061
1905........	262,246,635	203,458,724	118,887,189	610,238,899	1,220,031,970	1,499,942	90,293,483
1906........	361,210,563	194,267,949	141,820,720	741,516,886	1,464,960,356	1,208,989	119,893,833
1907........	250,418,699	209,481,496	166,427,409	627,559,660	1,268,065,412	1,539,267	86,368,228
1908........	241,189,929	221,769,634	149,505,937	603,413,770	1,237,210,760	1,049,545	55,063,860
1909........	244,578,674	212,170,224	52,354,980	528,722,933	1,053,142,066	896,279	37,665,040
1910........	152,163,107	146,685,385	40,031,590	362,927,671	707,110,062	922,078	38,128,498
1911........	*156,675,310*	*157,709,316*	*45,729,471*	*476,107,857*	*879,455,006*	*1,721,106*	*65,614,522*
1912........	208,574,208	204,044,491	56,321,469	532,255,865	1,071,951,724	1,456,381	41,797,291
1913........	200,993,584	159,544,687	53,749,023	519,025,384	984,696,710	2,150,132	50,780,143
1914........	193,964,252	165,881,791	45,543,085	481,457,792	921,913,029	1,506,569	10,725,819

[1] Includes beef, canned, cured; beef, cured—other; beef, fresh; oils, oleo oil; oleomargarin; tallow.

[2] Subsequent to 1904, including shoulders.

[3] Includes lard; lard, neutral; pork, canned; pork, cured—bacon; pork, cured—hams; pork, cured—salted or pickled; pork, fresh.

TABLE 183.—*Exports of selected domestic agricultural products, 1852–1914*—Continued.

Year ending June 30—	Lard compounds.	Cotton.	Glucose and grape sugar.	Corn oil, cake, and oil-cake meal.	Cottonseed oil, cake, and oil-cake meal.	Prunes.	Tobacco.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Average:							
1852–1856	....	1,110,498,083	....	....	....	....	140,183,800
1857–1861	....	1,125,715,497	....	....	....	....	167,710,800
1862–1866	....	137,582,133	....	....	....	....	140,207,850
1867–1871	....	902,410,338	....	....	....	....	194,753,637
1872–1876	....	1,248,805,497	....	....	....	....	241,848,410
1877–1881	....	1,738,892,268	....	....	....	....	266,315,190
1882–1886	....	1,968,178,266	4,473,550	....	....	....	237,941,913
1887–1891	....	2,439,650,456	27,686,298	....	....	....	259,248,361
1892–1896	....	2,736,655,351	125,574,007	....	....	....	281,746,279
1897–1901	21,792,477	3,447,909,578	209,279,772	....	1,005,099,895	....	304,401,701
1902–1906	52,954,358	3,632,267,952	154,866,980	21,888,135	1,066,790,196	48,550,774	325,538,515
1907–1911	75,765,254	4,004,770,051	145,064,783	61,732,807	989,738,130	47,039,287	334,395,923
1901	23,359,966	3,359,062,360	204,209,974	12,703,209	1,258,687,317	10,021,564	315,787,782
1902	36,201,744	3,528,974,636	130,419,611	14,740,498	1,050,466,246	23,358,849	301,007,365
1903	46,130,004	3,569,141,969	126,239,981	8,093,222	1,100,392,988	66,385,215	368,184,084
1904	53,603,545	3,089,855,906	152,768,716	14,014,885	820,349,073	73,146,214	311,971,831
1905	61,215,187	4,339,322,077	175,250,580	24,171,127	1,251,907,996	54,993,849	334,302,091
1906	67,621,310	3,634,045,170	189,656,011	48,420,942	1,110,834,678	24,869,744	312,227,202
1907	80,148,861	4,518,217,220	151,629,441	56,808,972	1,340,967,136	44,400,104	340,742,864
1908	75,183,210	3,816,998,693	129,686,834	66,127,704	929,287,467	28,148,450	330,812,658
1909	75,183,196	4,447,985,202	112,224,504	53,233,890	1,233,750,327	22,602,288	287,900,946
1910	74,556,603	3,206,708,226	149,820,088	49,108,598	640,088,766	89,014,880	357,196,074
1911	73,754,400	4,033,940,915	181,963,046	83,384,870	804,596,955	51,030,711	355,327,072
1912	62,522,888	5,535,125,429	171,156,259	72,490,021	1,293,690,138	74,328,074	379,845,320
1913	67,456,832	4,562,295,675	200,149,246	76,262,845	1,128,092,367	117,950,875	418,796,906
1914	58,303,564	4,760,940,538	199,530,874	59,030,623	799,974,252	69,813,711	449,749,982

Year ending June 30—	Hops.	Oils, vegetable—cottonseed oil.	Rice and rice bran, meal, and polish.	Sugar, raw and refined.	Wheat.	Wheat flour.	Wheat and wheat flour (converted to wheat).
	Pounds.	*Gallons.*	*Pounds.*	*Pounds.*	*Bushels.*	*Barrels.*	*Bushels.*
Average:							
1852–1856	1,162,802	....	56,514,840	7,730,322	4,715,021	2,891,562	19,172,830
1857–1861	2,216,095	....	65,732,080	6,015,058	12,378,351	3,318,280	28,969,749
1862–1866	4,719,330	....	2,257,860	3,007,777	22,529,735	3,580,757	40,183,518
1867–1871	6,486,616	....	1,856,948	4,356,900	22,106,833	2,585,115	35,032,409
1872–1876	3,446,466	547,450	391,344	20,142,169	48,957,518	3,415,871	66,036,873
1877–1881	10,445,654	4,498,436	602,442	41,718,443	107,780,556	5,375,583	133,262,753
1882–1886	9,584,437	3,467,905	561,406	107,129,770	82,883,913	8,620,199	121,674,809
1887–1891	7,184,147	7,120,796	3,209,653	75,073,838	64,739,011	11,286,568	115,528,566
1892–1896	15,146,667	15,782,647	10,277,947	13,999,349	99,913,895	15,713,279	170,623,652
1897–1901	15,467,314	42,863,203	18,407,139	11,213,664	120,247,430	17,151,070	197,427,246
1902–1906	11,476,272	38,605,737	45,977,670	14,897,014	70,527,077	15,444,100	140,025,529
1907–1911	14,774,185	38,783,550	27,194,549	61,429,802	62,854,580	11,840,699	116,137,728
1901	14,963,676	49,356,741	25,527,846	8,874,860	132,060,667	18,650,979	215,990,073
1902	10,715,151	33,042,848	29,501,274	7,572,452	154,856,102	17,759,203	234,772,516
1903	7,794,705	35,642,994	19,760,448	10,520,156	114,181,420	19,716,484	202,905,598
1904	10,985,988	29,013,743	29,121,763	15,418,537	44,230,169	16,999,432	120,727,613
1905	14,858,612	51,535,580	113,282,760	18,348,077	4,394,402	8,826,335	44,112,910
1906	13,026,904	43,793,519	38,142,103	22,175,846	34,973,291	13,919,048	97,609,007
1907	16,809,534	41,880,304	30,174,371	21,237,608	76,569,423	15,584,667	146,700,425
1908	22,920,480	41,019,991	28,444,415	25,510,643	100,371,057	13,927,247	163,043,669
1909	10,446,884	51,087,329	20,611,429	79,946,297	66,923,244	10,521,161	114,268,468
1910	10,589,254	29,860,667	26,779,188	125,507,022	46,679,876	9,040,987	87,364,318
1911	13,104,774	30,069,459	30,063,341	54,947,444	23,729,302	10,129,435	69,311,760
1912	12,190,663	53,262,796	39,446,571	79,594,034	30,160,212	11,006,487	79,689,404
1913	17,591,195	42,031,052	38,908,057	48,994,761	91,602,974	11,394,805	141,132,166
1914	24,262,896	25,728,411	22,414,328	50,895,726	92,393,775	11,821,461	145,590,349

TABLE 184.—*Imports of selected agricultural products, 1852–1914.*

[Compiled from reports of Foreign Commerce and Navigation of the United States. Where figures are lacking, either there were no imports or they were not separately classified for publication. "Silk" includes, prior to 1881, only "Silk, raw or as reeled from the cocoon"; in 1881 and 1882 are included this item and "Silk waste"; after 1882, both these items and "Silk cocoons." From "Cocoa and chocolate" are omitted in 1860, 1861, and in 1872 to 1881, small quantities of chocolate, the official returns for which were given only in value. "Jute and jute butts" includes in 1858 and 1859 an unknown quantity of "Sisal grass, coir, etc.," and in 1865–1868 an unknown quantity of "Hemp." Cattle hides are included in "Hides and skins other than cattle and goat" in 1895–1897. Olive oil for table use includes in 1862–1864 and 1885–1905 all olive oil. Sisal grass includes in 1884–1890 "Other vegetable substances." Hemp includes in 1885–1888 all substitutes for hemp.]

Year ending June 30—	Cheese.	Silk.	Wool.	Almonds.	Argols or wine lees.	Cocoa and chocolate, total.	Coffee.
Average:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1852–1856	1,053,983	....	19,067,447	3,460,807	....	2,486,572	196,582,863
1857–1861	1,378,147	....	....	3,251,091	....	3,063,893	216,235,090
1862–1866	....	....	....	2,482,063	1,354,947	2,453,141	124,551,992
1867–1871	....	681,669	....	....	2,360,529	3,502,614	248,726,019
1872–1876	....	1,094,948	....	....	4,951,473	4,857,364	307,006,928
1877–1881	....	1,922,269	62,744,282	....	12,403,256	6,315,488	384,282,199
1882–1886	....	4,672,846	83,293,800	....	17,551,967	11,568,173	529,578,782
1887–1891	8,335,323	6,564,121	117,763,889	5,860,728	21,433,570	18,322,049	509,367,994
1892–1896	9,649,752	8,382,892	162,640,491	7,487,676	26,409,990	25,475,234	597,494,217
1897–1901	12,588,515	10,962,210	163,979,079	7,361,198	24,379,847	38,209,423	816,570,082
1902–1906	22,165,754	17,187,544	193,656,402	10,920,881	27,647,440	70,901,254	980,119,167
1907–1911	37,662,812	22,143,461	199,562,649	15,297,414	29,350,692	113,673,368	934,533,322
1901	15,329,009	10,405,555	103,583,505	5,140,232	28,598,781	47,020,204	854,871,310
1902	17,067,714	14,234,826	166,576,966	9,868,982	29,276,148	52,878,587	1,091,004,252
1903	20,671,384	15,270,859	177,137,796	8,142,164	29,966,557	65,046,884	915,086,380
1904	22,707,103	16,722,709	173,742,834	9,838,852	24,571,730	75,070,746	995,043,284
1905	23,095,705	22,357,307	249,135,746	11,745,081	26,281,931	77,383,024	1,047,792,984
1906	27,286,866	17,352,021	201,688,668	16,009,326	28,140,835	84,127,027	851,668,933
1907	33,848,766	18,743,904	203,847,545	14,233,613	30,540,893	97,059,513	985,321,473
1908	32,530,830	16,662,132	125,980,524	17,144,968	26,738,834	86,604,684	890,640,057
1909	35,548,143	25,187,957	266,409,304	11,029,421	32,115,646	132,660,931	1,049,868,768
1910	40,817,524	23,457,223	263,928,232	18,556,356	28,182,956	111,070,834	871,469,516
1911	45,568,797	26,666,091	137,647,641	16,522,712	29,175,133	140,970,877	875,366,797
1912	46,542,007	28,584,962	193,400,713	17,231,458	23,661,078	148,785,846	885,201,247
1913	49,387,944	32,101,555	195,293,255	15,670,558	29,479,119	143,509,852	868,130,757
1914	63,784,313	34,545,829	38,094,480	19,038,405	29,793,011	179,364,091	1,001,528,317

Year ending June 30—	Flax.	Hemp.	Hops.	Jute and jute butts.	Licorice root.	Manila.	Molasses.
Average:	*Long tons.*	*Long tons.*	*Pounds.*	*Long tons.*	*Pounds.*	*Long tons.*	*Gallons.*
1852–1856	1,143	1,574	....	3,244	....	12,084	28,488,888
1857–1861	....	2,652	....	17,239	1,372,573	....	30,190,875
1862–1866	....	....	....	3,213	1,887,892	15,566	34,262,923
1867–1871	....	....	....	14,909	....	....	53,322,088
1872–1876	4,170	22,711	....	49,158	....	....	44,815,321
1877–1881	4,260	22,458	....	62,496	....	....	32,638,963
1882–1886	5,678	30,557	1,618,879	91,058	....	....	35,019,689
1887–1891	7,021	36,919	7,771,672	104,887	59,275,373	....	30,543,299
1892–1896	6,785	5,409	2,386,240	84,111	86,444,974	47,354	15,474,619
1897–1901	7,008	4,107	2,381,899	93,970	87,475,620	47,217	6,321,160
1902–1906	8,574	5,230	5,205,867	101,512	99,543,395	60,813	17,191,821
1907–1911	9,721	6,368	6,769,965	100,420	96,111,469	67,289	24,147,348
1901	6,878	4,057	2,606,708	103,140	100,105,654	43,735	11,458,156
1902	7,772	6,054	2,805,293	128,963	109,077,323	56,453	14,391,215
1903	8,155	4,919	6,012,510	79,703	88,580,611	61,648	17,240,399
1904	10,123	5,871	2,758,163	96,735	89,463,182	65,666	18,828,530
1905	8,089	3,987	4,339,379	98,215	108,443,892	61,562	19,477,885
1906	8,729	5,317	10,113,989	103,945	102,151,969	58,738	16,021,076
1907	8,656	8,718	6,211,893	104,489	66,115,863	54,513	24,630,935
1908	9,528	6,213	8,493,265	107,533	109,355,720	52,467	18,882,758
1909	9,670	5,208	7,386,574	156,665	97,742,776	61,902	22,092,696
1910	12,761	6,423	3,200,560	68,155	82,207,496	93,253	31,282,165
1911	7,792	5,278	8,557,531	65,238	125,135,490	74,308	23,838,190
1912	10,900	5,607	2,991,125	101,001	74,582,225	68,536	28,828,213
1913	12,421	7,663	8,494,144	125,389	105,116,227	73,823	83,926,521
1914	9,885	8,822	5,382,025	100,033	115,636,131	49,688	51,410,271

TABLE 184.—*Imports of selected agricultural products, 1852–1914*—Continued.

Year ending June 30—	Olive oil, for table use.	Opium, crude.	Potatoes.	Rice, and rice flour, rice meal, and broken rice.	Sisal grass.	Sugar, raw and refined.	Tea.
Average:	*Gallons.*	*Pounds.*	*Bushels.*	*Pounds.*	*Long tons.*	*Pounds.*	*Pounds.*
1852–1856	....	110,143	406,611	....	....	479,373,648	24,959,922
1857–1861	....	113,594	....	....	....	691,323,833	28,149,643
1862–1866	177,947	128,590	251,637	70,893,331	615	672,637,141	30,869,450
1867–1871	152,827	209,096	216,077	52,953,577	....	1,138,464,815	44,052,805
1872–1876	174,555	365,071	254,615	72,536,435	....	1,614,055,119	62,436,359
1877–1881	*218,507*	*407,656*	*1,850,106*	*62,614,706*	....	*1,760,508,290*	*67,583,083*
1882–1886	....	391,946	2,834,736	99,870,675	....	2,458,490,409	74,781,418
1887–1891	758,352	475,299	3,878,580	156,868,635	40,274	3,003,283,854	84,275,049
1892–1896	773,692	528,785	1,804,649	160,807,652	50,129	3,827,799,481	92,782,175
1897–1901	909,249	567,681	495,150	165,231,669	70,297	3,916,433,945	86,809,270
1902–1906	1,783,425	537,576	2,662,121	150,913,654	96,832	3,721,782,404	98,677,584
1907–1911	3,897,224	489,513	1,907,405	215,892,467	102,440	3,997,156,461	96,742,977
1901	983,059	583,208	371,911	117,199,710	70,076	3,975,005,840	89,806,453
1902	1,339,097	534,189	7,656,162	157,658,894	89,553	3,031,915,875	75,579,125
1903	1,494,132	516,570	358,505	169,656,284	87,025	4,216,108,106	108,574,905
1904	1,713,590	573,055	3,166,581	154,221,772	109,214	3,700,623,613	112,905,541
1905	1,923,174	594,680	181,199	106,483,515	100,301	3,680,932,998	102,706,599
1906	2,447,131	469,387	1,948,160	166,547,957	98,037	3,979,331,430	93,621,750
1907	*3,449,517*	*565,252*	*176,917*	*209,603,180*	*99,061*	*4,391,839,975*	*86,368,490*
1908	3,799,112	285,845	403,952	212,783,392	103,994	3,371,997,112	94,149,564
1909	4,129,454	517,388	8,383,966	232,900,422	91,451	4,189,421,018	114,916,520
1910	*3,702,210*	*449,239*	*353,208*	*225,400,545*	*99,966*	*4,094,545,936*	*85,626,370*
1911	4,405,827	629,842	218,984	208,774,795	117,727	3,937,978,265	102,563,942
1912	4,836,515	399,837	13,734,695	190,063,331	114,467	4,104,618,393	101,406,816
1913	5,221,001	508,433	327,230	222,103,547	153,869	4,740,041,488	94,612,800
1914	6,217,560	455,200	3,645,993	290,194,917	215,547	5,066,821,873	91,130,815

Year ending June 30—	Beeswax.	Onions.	Plums and prunes.	Raisins.	Currants.	Dates.	Figs.
Average:	*Pounds.*	*Bushels.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1887–1891	128,790	....	60,237,642	38,545,635	....	....	9,783,650
1892–1896	279,839	....	12,405,549	17,745,925	34,397,754	14,914,349	10,117,049
1897–1901	*265,143*	*628,358*	*560,762*	*7,669,593*	*27,520,440*	*15,653,842*	*8,919,921*
1902–1906	456,727	924,418	563,900	7,344,676	35,457,213	25,649,432	14,334,760
1907–1911	845,720	1,103,034	....	5,283,145	35,258,628	26,059,353	19,848,037
1901	213,773	774,042	745,974	3,860,836	16,049,198	20,013,681	9,933,871
1902	408,706	796,316	522,478	6,683,545	36,238,976	21,681,159	11,087,131
1903	488,576	925,599	633,819	6,715,675	33,878,209	43,814,917	16,482,142
1904	425,168	1,171,242	494,105	6,867,617	38,347,649	21,058,164	13,178,061
1905	*373,569*	*856,366*	*671,604*	*4,041,689*	*31,742,919*	*19,257,250*	*13,364,107*
1906	587,617	872,566	497,494	12,414,855	37,078,311	22,435,672	17,563,358
1907	*917,088*	*1,126,114*	*323,377*	*3,967,151*	*38,392,779*	*31,270,899*	*24,346,173*
1908	671,526	1,275,333	335,089	9,132,353	38,652,656	24,958,343	18,836,574
1909	764,937	674,530	296,123	5,794,320	32,482,111	21,869,218	15,235,513
1910	972,145	1,024,226	....	5,042,683	33,326,030	22,693,713	17,362,197
1911	902,604	1,514,967	....	2,479,220	33,439,565	20,504,592	23,459,729
1912	1,076,741	1,436,037	....	3,255,861	33,151,896	25,208,248	16,765,408
1913	828,793	789,458	....	2,579,705	30,843,735	34,304,951	16,837,819
1914	1,412,200	1,114,811	....	4,564,549	32,033,177	34,073,608	19,284,868

TABLE 184.—*Imports of selected agricultural products, 1852–1914*—Continued.

Year ending June 30—	Hides and skins, other than furs.			Macaroni, vermicelli, and all similar preparations.	Lemons.	Oranges.	Walnuts.
	Cattle.	Goat.	Other than cattle and goat.				
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Average:							
1897–1901	....	68,052,973	91,173,311	....	....	....	....
1902–1906	126,995,011	93,674,819	115,952,418	....	153,160,863	41,104,544	....
1907–1911	178,681,537	94,329,840	143,351,321	99,724,072	153,343,434	12,089,790	30,980,661
1901	139,174,624	73,745,596	77,969,617	....	148,514,614	50,332,914	....
1902	148,627,907	88,038,516	89,457,680	....	164,075,309	52,742,476	....
1903	131,644,325	85,114,070	102,340,303	28,787,821	152,004,213	56,872,070	12,362,567
1904	85,370,168	86,338,547	103,024,752	40,224,202	171,923,221	35,893,260	23,670,761
1905	113,177,357	97,803,571	126,893,934	53,441,080	139,084,321	28,880,575	21,684,104
1906	156,155,300	111,079,391	158,045,419	77,928,029	138,717,252	31,134,341	24,917,028
1907	134,671,020	101,201,596	135,111,199	87,720,730	157,859,906	21,267,346	32,597,592
1908	98,353,249	63,640,758	120,770,918	97,233,708	178,490,003	18,397,429	28,887,110
1909	192,252,083	104,048,244	148,253,998	85,114,003	135,183,550	8,435,873	28,157,763
1910	318,003,538	115,844,758	174,770,732	113,772,801	160,214,785	4,676,118	33,641,466
1911	150,127,796	86,913,842	137,849,757	114,779,116	134,968,924	7,672,186	33,619,434
1912	251,012,513	95,340,703	191,414,882	108,231,028	145,639,396	7,628,662	37,213,674
1913	268,042,390	96,250,305	207,903,995	106,500,752	151,416,412	12,252,960	26,662,441
1914	279,963,488	84,759,428	196,347,770	126,128,621	....	....	37,193,728

TABLE 185.—*Foreign trade of the United States in forest products, 1852–1914.*

[Compiled from reports of Foreign Commerce and Navigation of the United States. All values are gold.]

Year ending June 30—	Exports.		Imports.	Excess of exports (+) or of imports (−).
	Domestic.	Foreign.		
Average:				
1852–1856	$6,819,079	$694,037	$3,256,302	+$4,256,814
1857–1861	9,994,808	962,142	6,942,211	+ 4,014,739
1862–1866	7,366,103	798,076	8,511,370	− 347,191
1867–1871	11,775,297	690,748	14,812,576	− 2,346,531
1872–1876	17,906,771	959,862	19,728,458	− 861,825
1877–1881	17,579,313	552,514	22,006,227	− 3,874,400
1882–1886	24,704,992	1,417,226	34,252,753	− 8,130,535
1887–1891	26,060,729	1,442,760	39,647,297	−12,143,798
1892–1896	29,276,428	1,707,307	45,091,081	−14,107,346
1897–1901	45,960,863	3,283,274	52,326,879	− 3,082,742
1902–1906	63,584,670	3,850,221	79,885,457	−12,450,566
1907–1911	88,764,471	6,488,455	137,051,471	−41,798,545
1901	55,369,161	3,599,192	57,143,650	+ 1,824,703
1902	48,928,764	3,609,071	59,187,049	− 6,649,214
1903	58,734,016	2,865,325	71,478,022	− 9,878,681
1904	70,085,789	4,177,352	79,619,296	− 5,356,155
1905	63,199,348	3,790,097	92,680,555	−25,691,110
1906	76,975,431	4,809,261	96,462,364	−14,677,672
1907	92,948,705	5,500,331	122,420,776	−23,971,740
1908	90,362,073	4,570,397	97,733,092	− 2,800,622
1909	72,442,454	4,982,810	123,920,126	−46,494,862
1910	85,030,230	9,801,881	178,871,797	−84,039,686
1911	103,038,892	7,586,854	162,311,565	−51,685,819
1912	108,122,254	6,413,348	172,523,466	−57,987,868
1913	124,835,784	7,431,851	180,502,444	−48,234,809
1914	106,978,554	4,517,766	155,261,300	−43,764,980

TABLE 186.—*Exports of selected domestic forest products, 1852–1914.*

[Compiled from reports of Foreign Commerce and Navigation of the United States. Where figures are lacking, either there were no exports or they were not separately classified for publication.]

Year ending June 30—	Lumber.			Rosin.	Spirits of turpentine.	Timber.	
	Boards, deals, and planks.[1]	Shooks, other than box.	Staves.			Hewn.	Sawed.
Average:	*M feet.*	*Number.*	*Number.*	*Barrels.*	*Gallons.*	*Cubic feet.*	*M feet.*
1852–1856	129,499			552,210	1,369,250		
1857–1861	205,476			664,206	2,735,104		
1862–1866	138,020			69,314	107,162		
1867–1871	138,720			491,774	2,693,412		
1872–1876	221,658			845,803		17,459,632	
1877–1881	303,114				7,138,556	18,316,876	
1882–1886	433,963			1,289,869	9,301,894	13,701,663	
1887–1891	531,755	593,054		1,533,834	10,794,025	6,401,543	218,796
1891–1896	616,090	435,581		2,006,427	14,258,928	6,062,418	263,641
1897–1901	957,218	668,797		2,477,696	18,349,386	5,146,927	428,755
1902–1906	212,476	765,215	51,234,056	2,453,280	16,927,090	3,968,469	508,212
1907–1911	1,649,203	925,828	56,181,900	2,355,560	16,658,955	3,406,245	479,776
1901	1,101,815	714,651	47,363,262	2,820,815	20,240,851	4,624,698	533,920
1902	942,814	788,241	46,998,512	2,535,962	19,177,788	5,388,439	412,750
1903	1,065,771	566,205	55,879,010	2,396,498	16,378,787	3,291,498	530,659
1904	1,426,784	533,182	47,420,095	2,585,108	17,202,808	3,788,740	558,690
1905	1,283,406	872,192	48,286,285	2,310,275	15,894,813	3,856,623	486,411
1906	1,343,607	1,066,253	57,586,378	2,438,556	15,981,253	3,517,046	552,548
1907	1,623,964	803,346	51,120,171	2,560,966	15,854,676	3,278,110	600,865
1908	1,548,130	900,812	61,696,949	2,712,732	19,532,583	4,883,506	463,440
1909	1,357,822	977,376	52,583,016	2,170,177	17,502,028	2,950,528	383,309
1910	1,684,489	928,197	49,783,771	2,144,318	15,587,737	3,245,196	451,721
1911	2,031,608	1,019,411	65,725,595	2,189,607	14,817,751	2,673,887	499,547
						M feet.	
1912	2,306,680	1,161,591	64,162,599	2,474,460	19,399,241	31,067	406,954
1913	2,550,308	1,710,095	89,005,624	2,806,046	21,039,597	34,502	477,185
1914	2,405,296	867,805	77,150,635	2,417,950	18,900,704	29,859	411,307

[1] Including "Joists and scantling," prior to 1884.

TABLE 187.—*Imports of selected forest products, 1852–1914.*

Year ending June 30—	Camphor, crude.	India rubber.	Rubber gums, total.	Lumber.		Shellac.	Wood pulp.
				Boards, deals, planks, and other sawed.	Shingles.		
Average:	*Pounds.*	*Pounds.*	*Pounds.*	*M feet.*	*M.*	*Pounds.*	*Long tons.*
1852–1856	213,720	....	....	....	....	....	....
1857–1861	360,522	....	....	....	....	....	....
1862–1866	386,731	....	....	....	....	634,276	....
1867–1871	....	....	[1] 7,389,890	....	....	....	....
1872–1876	....	....	12,631,388	564,642	88,197	....	....
1877–1881	1,515,614	....	15,610,634	417,907	55,394	....	....
1882–1886	1,958,608	....	24,480,997	577,728	87,760	....	....
1887–1891	2,273,883	....	33,226,520	646,745	184,050	5,086,421	37,251
1892–1896	1,491,902	38,359,547	39,671,553	661,495	....	5,848,339	42,771
1897–1901	1,858,018	47,469,136	52,974,744	566,394	....	8,839,232	46,827
1902–1906	2,139,183	57,903,641	75,908,633	727,205	772,340	11,613,967	130,764
1907–1911	2,939,167	80,129,567	121,504,098	899,659	866,565	19,046,030	319,007
1901	2,175,784	55,275,529	64,927,176	490,820	555,853	9,608,745	46,757
1902	1,831,058	50,413,481	67,790,069	665,603	707,614	9,064,789	67,416
1903	2,472,440	55,010,571	69,311,678	720,937	724,131	11,590,725	116,881
1904	2,819,673	59,015,551	74,327,584	589,232	770,373	10,933,413	144,796
1905	1,904,002	67,234,256	87,004,284	710,538	768,725	10,700,817	167,504
1906	1,668,744	[2] 57,844,345	81,109,451	949,717	900,856	15,780,090	157,224
1907	3,138,070	[2] 76,963,838	106,747,589	934,195	881,003	17,785,960	213,110
1908	2,814,299	[2] 62,233,160	85,809,625	791,288	988,081	13,361,932	237,514
1909	1,990,499	[2] 88,359,895	114,598,768	846,024	1,058,363	19,185,137	274,217
1910	3,026,646	[2] 101,044,681	154,620,629	1,054,416	762,798	29,402,182	378,322
1911	3,726,319	72,046,260	145,743,880	872,374	642,582	15,494,940	491,873
1912	2,154,646	110,210,173	175,965,538	905,275	514,657	18,745,771	477,508
1913	3,709,264	113,384,359	170,747,339	1,090,628	560,297	21,012,015	502,913
1914	3,476,908	131,995,742	161,777,250	931,408	895,038	16,719,756	508,360

[1] Includes "Gutta-percha" only, for 1867.

[2] Includes "Guayule gum," crude.

TABLE 188.—*Principal farm products imported from specified countries into the United States, 1912–1914.*

Country from which consigned, and article.	Year ending June 30—					
	1912		1913		1914	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Brazil:						
Cocoa (crude)...pounds..	17,173,568	$1,800,755	14,354,460	$1,642,714	25,870,186	$2,764,766
Coffee..............do....	632,527,267	83,869,713	639,262,011	87,867,451	743,113,500	76,016,463
British West Indies:						
Bananas.......bunches..	15,474,513	4,405,234	11,164,894	3,488,964	15,677,191	4,849,037
Cocoa...........pounds..	36,447,160	4,278,697	29,588,055	4,040,691	44,062,426	5,372,327
Canada: Tea.........do....	2,558,583	734,769	3,024,508	874,544	3,112,383	864,814
China: Tea..........do....	17,605,670	2,260,949	23,728,418	3,247,761	20,139,342	2,755,512
Colombia: Coffee....do....	*62,912,252*	*6,863,784*	*69,684,514*	*11,728,459*	*91,830,513*	*11,556,038*
Cuba:						
Bananas.......bunches..	2,478,581	942,481	2,213,733	834,206	2,354,395	853,536
Sugar (raw).....pounds..	3,186,630,468	91,106,014	4,311,744,043	93,703,674	4,926,606,243	98,394,782
Ecuador: Cocoa......do....	22,976,780	2,143,005	15,229,159	1,606,253	26,319,735	2,693,674
France:						
Cheese.............do....	3,862,891	942,683	3,982,513	785,965	5,418,904	1,032,817
Olive oil, salad..gallons..	809,029	1,327,520	932,536	1,465,635	949,858	1,512,324
Italy:						
Cheese..........pounds..	20,625,202	3,948,550	21,326,445	4,217,674	26,453,826	5,024,270
Macaroni..........do....	102,905,968	4,481,109	102,050,089	4,692,468	121,924,372	5,481,187
Olive oil (salad)..gallons..	3,245,863	4,159,273	3,584,945	4,619,156	4,319,567	5,552,098
Japan: Tea.......pounds..	53,747,386	9,213,402	44,381,278	7,793,197	41,913,273	7,171,202
Mexico: Coffee.......do....	34,156,025	5,211,629	26,121,439	4,090,909	49,385,504	8,028,186
Netherlands:						
Cheese.............do....	3,109,104	437,011	3,420,790	439,079	3,658,763	455,159
Coffee..............do....	1,941,746	342,468	1,956,676	350,093	5,811,934	920,723
Philippine Islands: Sugar, pounds....................	435,570,122	11,243,693	203,160,972	4,593,199	116,749,211	2,553,601
Portugal: Cocoa..pounds..	18,954,405	2,062,966	23,040,617	2,962,644	17,738,638	2,292,959
Santo Domingo: Cocoa, pounds....................	27,786,868	2,886,995	27,241,763	3,068,655	26,782,966	3,187,006
Switzerland: Cheese, pounds....................	15,147,393	2,857,631	17,371,616	3,183,350	22,490,006	3,617,721
United Kingdom:						
Cocoa.............pounds..	8,791,716	1 [illegible] 04	11,660,464	1,538,225	12,903,640	1,633,424
Tea................do....	12,887,949	3,[illegible],200	12,238,114	3,619,098	14,077,601	3,858,970

TABLE 189.—*Principal farm products exported to specified countries from the United States, 1912–1914.*

Country to which consigned, and article.	Year ending June 30— 1912		1913		1914	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Belgium:						
Corn..............bushels..	1,406,508	$1,006,231	1,648,089	$967,838	60,227	$38,196
Wheat...............do....	4,054,171	3,971,061	10,601,248	10,402,577	12,873,372	12,479,315
Bacon.............pounds..	4,503,110	556,100	9,140,688	1,280,658	5,110,170	743,371
Hams and shoulders..do....	15,017,836	1,654,616	5,821,638	792,214	4,080,669	568,140
Lard.................do....	21,743,806	2,143,636	18,761,624	2,074,640	15,915,380	1,833,325
Brazil: Wheat flour...barrels..	625,399	3,277,981	683,418	3,105,239	748,612	3,752,105
Canada:						
Corn..............bushels..	9,568,574	6,568,671	8,097,882	4,766,805	4,641,737	3,328,785
Wheat...............do....	537,240	489,194	851,139	829,447	4,113,701	3,821,159
Wheat flour........barrels..	99,760	419,033	98,665	450,104	122,752	539,942
Bacon.............pounds..	3,342,270	481,163	6,868,480	1,007,014	11,082,930	1,644,388
Hams and shoulders..do....	6,281,607	906,701	6,785,477	1,046,349	4,006,649	672,855
Lard.................do....	7,968,353	804,715	11,079,696	1,251,426	15,995,669	1,847,515
Pork, pickled.........do....	11,156,806	1,007,026	9,436,506	943,799	12,826,741	1,378,501
China: Wheat flour...barrels..	*741,192*	*2,895,286*	*127,814*	*493,364*	*136,374*	*540,154*
Cuba:						
Corn..............bushels..	2,117,724	1,641,851	2,372,678	1,696,821	2,410,156	1,878,664
Wheat flour........barrels..	842,168	3,953,385	907,786	4,311,027	892,705	4,057,806
Bacon.............pounds..	4,822,080	526,819	6,658,202	804,616	13,733,773	1,694,755
Hams and shoulders..do....	5,084,977	709,780	6,002,471	936,058	5,637,829	940,720
Lard.................do....	42,548,701	4,154,046	46,526,427	5,181,445	49,609,751	5,682,074
Pork, pickled.........do....	9,988,925	879,998	9,141,098	943,303	4,090,780	447,374
Denmark: Corn.....bushels..	1,545,624	1,106,451	5,389,897	3,021,673	118	95
Finland: Wheat flour.barrels..	175,575	869,463	405,832	2,060,268	429,354	2,085,441
France:						
Wheat.............bushels..	35,977	38,455	4,931,708	4,994,638	5,536,731	5,384,663
Bacon.............pounds..	9,418,140	978,451	2,096,868	236,160	197,353	25,416
Lard.................do....	24,474,920	2,445,882	17,428,157	1,807,530	5,307,986	573,493
Germany:						
Corn..............bushels..	6,800,562	4,874,657	6,545,521	3,696,182	303,303	225,209
Wheat...............do....	1,588,666	1,533,686	12,112,223	11,950,009	10,983,060	10,604,692
Wheat flour........barrels..	*130,328*	*671,985*	*170,345*	*860,805*	*176,485*	*891,171*
Lard..............pounds..	159,473,899	15,651,572	160,862,204	18,079,275	146,208,598	16,593,043
Lard, neutral.........do....	12,666,387	1,349,539	9,368,924	1,078,006	6,309,792	709,101
Oleo oil.............do....	18,042,333	1,910,286	17,480,760	2,054,694	16,180,268	1,631,254
Hongkong: Wheat flour, barrels........................	1,491,073	5,840,299	1,301,306	5,126,960	1,141,095	4,501,672
Italy:						
Wheat.............bushels..	533,009	596,916	7,217,479	7,419,597	1,839,830	1,789,400
Lard..............pounds..	3,170,799	313,040	6,106,153	657,097	5,958,983	616,946
Japan: Wheat flour...barrels..	716,347	2,750,405	878,623	3,383,842	793,269	3,045,532

Table 190.—*Shipments of principal domestic farm and forest products from the United States to Hawaii and Porto Rico, 1912–1914.*

[These shipments are not included in the domestic exports from or imports into the United States.]

Possession and article.	Year ending June 30—					
	1912		1913		1914	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
HAWAII.						
Dairy products ......pounds..	3,422,743	$458,228	3,937,495	$578,337	4,275,534	$562,516
Meat products..................	....	488,832	....	719,974	....	528,960
Grain and grain products......	....	2,423,401	....	2,282,034	....	2,221,197
Rice................pounds..	348,450	15,229	4,033,865	189,986	5,031,515	216,252
Lumber........................	....	1,239,668	....	1,502,117	....	876,544
PORTO RICO.						
Dairy products...... pounds..	4,013,509	435,465	2,833,463	288,465	2,210,881	207,817
Meat products..................	....	3,193,847	....	3,211,247	....	3,678,741
Beans and dried peas. bushels..	179,131	543,577	199,823	534,965	163,843	469,561
Grain and grain products......	....	2,653,362	....	2,585,826	....	2,248,045
Rice................pounds..	134,648,403	4,894,747	128,748,080	5,069,527	139,836,581	5,306,364
Sugar...................do....	13,412,818	754,204	13,443,894	636,012	16,855,067	727,966
Tobacco.................do....	3,083,712	422,207	2,337,501	373,975	1,627,405	327,790
Lumber........................	....	1,352,085	....	1,194,154	....	989,124

Table 191.—*Shipments of principal domestic farm products from Hawaii and Porto Rico to the United States.*

HAWAII.						
Coffee...............pounds..	2,131,920	336,343	2,149,875	352,965	4,430,723	657,853
Pineapples, canned...........	....	2,567,564	....	3,566,201	....	4,536,919
Sugar...............pounds..	1,205,465,510	49,961,509	1,085,362,344	36,607,820	1,114,750,702	33,187,920
PORTO RICO.						
Grapefruit.............boxes..	118,919	524,976	216,216	726,687	206,200	751,769
Oranges.................do....	277,399	584,368	353,633	740,010	348,870	752,088
Pineapples.....................	....	683,801	....	1,142,007	....	1,245,215
Molasses and sirup....gallons..	10,937,670	700,981	11,150,572	607,747	15,577,832	927,227
Sugar...............pounds..	734,289,872	31,544,063	765,420,310	26,619,158	641,252,527	20,239,831
Tobacco, leaf...........do....	4,680,781	2,228,125	6,952,467	3,006,854	6,308,227	2,961,614

TABLE 192.—*Destination of principal farm products exported from the United States, 1907–1914.*

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	Average, 1907–1911.	1912	1913	1914	Average, 1907–1911.	1912	1913	1914
ANIMAL MATTER.								
Cattle:	*Number.*	*Number.*	*Number.*	*Number.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Canada	9,535	6,705	11,691	8,957	3.8	6.4	47.3	48.7
United Kingdom	215,342	76,925	1,773	....	84.8	72.9	7.2	....
Other countries	28,990	21,876	11,250	9,419	11.4	20.7	45.5	51.3
Total	253,867	105,506	24,714	18,376	100.0	100.0	100.0	100.0
Horses:								
Canada	21,044	31,910	26,560	17,700	81.8	91.6	92.5	77.7
United Kingdom	806	517	430	609	3.1	1.5	1.5	2.7
Other countries	3,861	2,401	1,717	4,467	15.1	6.9	6.0	19.6
Total	25,711	34,828	28,707	22,776	100.0	100.0	100.0	100.0
Butter:								
Central American States and British Honduras	*Pounds.* 663,038	*Pounds.* 565,320	*Pounds.* 775,246	*Pounds.* 810,254	10.0	9.3	21.6	21.9
West Indies and Bermuda	1,344,969	1,488,538	1,392,508	1,158,111	20.4	24.4	38.8	31.4
Other countries	4,593,482	4,038,377	1,417,846	1,725,232	69.6	66.3	39.6	46.7
Total	6,601,489	6,092,235	3,585,600	3,693,597	100.0	100.0	100.0	100.0
Meat products:								
Beef products—								
Beef, canned—								
United Kingdom	9,485,003	5,743,114	3,117,149	1,157,104	59.5	52.1	45.6	33.4
Other countries	6,457,177	5,283,317	3,723,199	2,307,629	40.5	47.9	54.4	66.6
Total	15,942,180	11,026,431	6,840,348	3,464,733	100.0	100.0	100.0	100.0
Beef, fresh—								
Panama	3,762,984	5,400,785	5,935,198	5,534,391	2.6	35.4	80.6	86.6
United Kingdom	139,214,903	8,872,378	126,885	....	96.1	58.1	1.7	....
Other countries	1,821,848	991,157	1,300,305	860,013	1.3	6.5	17.7	13.4
Total	144,799,735	15,264,320	7,362,388	6,394,404	100.0	100.0	100.0	100.0
Beef, pickled, and other cured—								
Canada	2,215,941	1,752,093	712,086	1,831,150	4.8	4.6	2.8	5.7
Germany	5,548,342	4,616,317	3,080,823	1,757,786	12.0	12.1	11.9	7.6
Newfoundland and Labrador	5,116,545	5,077,404	3,807,237	4,935,657	11.1	13.3	14.7	21.2
West Indies and Bermuda	5,717,576	5,493,842	4,274,549	3,900,281	12.4	14.4	16.5	16.8
United Kingdom	13,376,801	8,747,355	5,929,949	4,113,347	29.0	23.0	22.9	17.7
Other countries	14,211,970	12,400,896	8,052,275	7,227,753	30.7	32.6	31.2	31.0
Total	46,187,175	38,087,907	25,856,919	23,265,974	100.0	100.0	100.0	100.0

TABLE 192.—*Destination of principal farm products exported from the United States, 1907–1914*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	Average, 1907–1911.	1912	1913	1914	Average, 1907–1911.	1912	1913	1914
ANIMAL MATTER—continued.								
Meat products—Con.								
Lard compounds—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Cuba	24,746,507	17,214,452	17,525,703	14,673,201	32.7	27.5	26.0	25.2
Mexico	6,695,549	6,768,838	4,127,593	3,119,285	8.8	10.8	6.1	5.4
United Kingdom	21,660,294	17,853,640	21,115,679	19,929,949	28.6	28.6	31.3	34.2
Other countries	22,662,904	20,685,958	24,687,857	20,581,129	29.9	33.1	36.6	35.2
Total	75,765,254	62,522,888	67,456,832	58,303,564	100.0	100.0	100.0	100.0
Pork products—								
Bacon—								
Belgium	7,149,191	4,603,110	9,140,688	5,110,170	3.4	2.2	4.5	2.6
Canada	1,811,913	3,342,270	6,868,480	11,082,930	.9	1.6	3.4	5.7
Cuba	6,045,118	4,822,680	6,658,202	13,733,773	2.9	2.3	3.3	7.1
France	1,214,689	9,418,140	2,096,868	197,353	.6	4.5	1.0	.1
Netherlands	3,460,962	7,271,025	7,639,281	1,718,481	1.7	3.5	3.8	.9
United Kingdom	171,689,186	147,448,565	138,133,416	132,819,680	82.1	70.7	68.7	68.5
Other countries	17,634,085	31,768,418	30,456,649	29,301,865	8.4	15.2	15.3	15.1
Total	209,005,144	208,574,208	200,993,584	193,964,252	100.0	100.0	100.0	100.0
Hams and shoulders, cured—								
Belgium	9,214,198	15,017,836	5,821,638	4,090,669	4.9	7.4	3.6	2.5
Canada	3,114,653	6,281,607	6,785,477	4,006,649	1.6	3.1	4.3	2.4
Cuba	3,976,487	5,084,977	6,002,471	5,637,829	2.1	2.5	3.8	3.4
United Kingdom	166,671,864	169,675,214	134,016,686	146,007,141	87.9	83.2	84.0	88.0
Other countries	6,626,009	7,984,857	6,918,415	6,149,503	3.5	3.8	4.3	3.7
Total	189,603,211	204,044,491	159,544,687	165,881,791	100.0	100.0	100.0	100.0
Lard—								
Belgium	21,552,873	21,743,806	18,761,624	15,915,380	4.1	4.1	3.6	3.3
Canada	9,272,128	7,968,353	11,079,696	15,995,669	1.8	1.5	2.1	3.3
Cuba	30,259,105	42,548,701	46,526,427	49,609,751	5.8	8.0	9.0	10.3
France	9,380,202	24,474,920	17,428,157	5,307,986	1.8	4.6	3.4	1.1
Germany	158,132,560	159,473,899	160,862,204	146,208,598	30.4	30.0	31.0	30.4
Italy	3,945,489	3,170,799	6,106,153	5,958,983	.8	.6	1.2	1.2
Mexico	7,739,370	8,366,011	8,468,353	3,294,437	1.5	1.6	1.6	.7
Netherlands	45,110,469	38,675,175	43,383,774	43,469,536	8.7	7.3	8.4	9.0
United Kingdom	191,388,901	186,125,234	168,379,790	164,632,676	36.8	35.0	32.4	34.2
Other countries	42,965,281	39,708,967	38,029,206	31,064,776	8.3	7.3	7.3	6.5
Total	519,746,378	532,255,865	519,025,384	481,457,792	100.0	100.0	100.0	100.0
Lard, neutral—								
Germany	(1)	12,666,387	9,368,924	6,309,792	(1)	20.3	20.9	21.5
Netherlands		40,110,521	27,123,927	13,174,294		64.4	60.6	44.9
Other countries		9,541,001	8,284,841	9,839,700		15.3	18.5	33.6
Total	(1)	62,317,909	44,777,692	29,323,786	(1)	100.0	100.0	100.0
Pork, pickled—								
Canada	10,315,634	11,156,806	9,436,506	12,825,741	11.4	19.8	17.6	28.2
Cuba	7,459,726	9,988,925	9,141,098	4,090,760	8.2	17.7	17.0	9.0
Newfoundland and Labrador	5,082,768	6,570,510	5,672,961	7,911,743	5.6	11.7	10.6	17.4
United Kingdom	38,860,198	13,500,861	14,619,714	5,571,720	42.8	24.0	27.2	12.2
Other countries	29,091,553	15,104,367	14,878,744	15,143,101	32.0	26.8	27.6	33.2
Total	90,809,879	56,321,469	53,749,023	45,543,065	100.0	100.0	100.0	100.0

TABLE 192.—*Destination of principal farm products exported from the United States, 1907–1914*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	Average, 1907–1911.	1912	1913	1914	Average, 1907–1911.	1912	1913	1914
VEGETABLE MATTER.								
Cotton:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Austria-Hungary	43,521,153	62,781,705	56,591,125	53,255,407	1.1	1.1	1.2	1.1
Belgium	68,383,979	105,951,588	113,483,414	113,736,761	1.7	1.9	2.5	2.4
Canada	67,820,937	90,832,199	76,007,216	75,496,339	1.7	1.6	1.7	1.6
France	498,430,925	614,146,911	537,493,608	569,699,520	12.4	11.1	11.8	12.0
Germany	1,122,977,141	1,578,085,504	1,221,943,252	1,442,161,777	28.0	28.5	26.8	30.3
Italy	238,215,462	318,038,666	250,411,639	268,678,515	5.9	5.7	5.5	5.6
Japan	92,334,530	240,467,144	198,389,341	176,720,027	2.3	4.3	4.3	3.7
Mexico	8,230,913	8,064,183	10,488,465	17,335,397	.2	.1	.2	.4
Russia, European	46,833,111	55,878,081	37,453,772	49,538,075	1.2	1.0	.8	1.0
Spain	126,092,800	156,749,987	158,976,935	148,669,641	3.1	2.8	3.5	3.1
United Kingdom	1,649,343,756	2,171,554,173	1,858,449,027	1,790,750,498	41.2	39.2	40.7	37.6
Other countries	42,585,344	132,575,288	42,607,881	54,898,581	1.2	2.7	1.0	1.2
Total	4,004,770,051	5,535,125,429	4,562,295,675	4,760,940,538	100.0	100.0	100.0	100.0
Fruits:								
Apples, dried—								
Germany	14,388,447	27,598,728	17,970,592	17,645,697	47.9	51.4	43.2	52.6
Netherlands	8,372,006	14,396,795	12,846,054	9,147,104	27.9	26.8	30.9	27.3
Other countries	7,297,779	11,669,116	10,757,916	6,773,359	24.2	21.8	25.9	20.1
Total	30,058,232	53,664,639	41,574,562	33,566,160	100.0	100.0	100.0	100.0
Apples, fresh—	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*				
Germany	116,681	122,823	272,382	168,792	9.5	8.4	12.7	11.2
United Kingdom	924,084	994,524	1,318,426	827,028	75.4	68.3	61.3	54.9
Other countries	184,890	339,034	559,324	510,749	15.1	23.3	26.0	33.9
Total	1,225,655	1,456,381	2,150,132	1,506,569	100.0	100.0	100.0	100.0
Apricots, dried—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
France	1,434,503	1,169,110	4,214,153	3,074,146	13.8	8.7	12.0	17.7
Germany	3,344,093	5,223,162	7,806,944	3,841,032	32.2	38.9	22.3	22.1
Netherlands	1,395,617	960,757	3,625,314	2,064,471	13.4	7.2	10.4	11.9
United Kingdom	1,833,209	3,012,091	13,174,672	4,473,534	17.6	22.5	37.6	25.7
Other countries	2,380,797	3,048,310	6,195,647	3,948,509	23.0	22.7	17.7	22.6
Total	10,388,219	13,413,430	35,016,730	17,401,692	100.0	100.0	100.0	100.0
Oranges—	*Boxes.*	*Boxes.*	*Boxes.*	*Boxes.*				
Canada	(1)	1,152,866	1,017,545	1,491,539	(1)	96.3	95.7	95.7
Other countries		44,497	45,688	67,382		3.7	4.3	4.3
Total	(1)	1,197,363	1,063,233	1,558,921	(1)	100.0	100.0	100.0
Prunes—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Canada	8,954,969	13,503,157	10,956,827	12,757,585	19.0	18.2	9.3	18.3
France	4,075,770	6,158,115	11,962,280	13,514,086	8.7	8.3	10.1	19.4
Germany	14,313,020	31,416,210	49,084,901	17,417,865	30.4	42.3	41.6	24.9
United Kingdom	7,095,577	6,586,572	8,492,618	11,175,968	15.1	8.9	7.2	16.0
Other countries	12,599,951	16,664,020	37,454,249	14,948,207	26.8	22.3	31.8	21.4
Total	47,039,287	74,328,074	117,950,875	69,813,711	100.0	100.0	100.0	100.0
ruits, canned—	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*				
United Kingdom	1,608,168	2,690,834	3,892,646	3,182,051	70.7	67.1	69.5	65.4
Other countries	666,374	1,321,629	1,706,727	1,681,895	29.3	32.9	30.5	34.6
Total	2,274,542	4,012,463	5,599,373	4,863,946	100.0	100.0	100.0	100.0
ucose and grape sugar:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
United Kingdom	121,565,094	137,249,475	155,597,018	162,715,262	83.8	80.2	77.7	81.5
Other countries	23,499,689	33,906,784	44,552,228	36,815,612	16.2	19.8	22.3	18.5
Total	145,064,783	171,156,259	200,149,246	199,530,874	100.0	100.0	100.0	100.0

[1] Quantity not stated prior to 1908.

TABLE 192.—*Destination of principal farm products exported from the United States, 1907–1914*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	Average, 1907–1911.	1912	1913	1914	Average, 1907–1911.	1912	1913	1914
VEGETABLE MATTER—continued.								
Grain and grain products:								
Corn—	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Belgium	*2,456,048*	*1,406,508*	*1,648,089*	*60,227*	*4.5*	*3.5*	*3.4*	*.6*
Canada	8,485,800	9,568,574	8,097,882	4,641,737	15.6	23.9	16.5	49.5
Cuba	2,145,491	2,117,724	2,372,678	2,410,156	4.0	5.3	4.8	25.7
Denmark	*3,420,393*	*1,545,624*	*5,389,897*	*118*	*6.3*	*3.9*	*11.0*	....
Germany	8,123,698	6,800,562	6,545,521	303,303	14.9	17.0	13.3	3.2
Mexico	2,604,700	1,168,145	543,340	467,424	4.8	2.9	1.1	5.0
Netherlands	*7,413,615*	*5,657,976*	*7,192,420*	*373,770*	*13.6*	*14.1*	*14.7*	*4.0*
United Kingdom	18,182,777	10,616,488	14,982,604	540,515	33.4	26.5	30.5	5.8
Other countries	1,598,228	1,157,194	2,292,536	583,605	2.9	2.9	4.7	6.2
Total	54,432,750	40,038,795	49,064,967	9,380,855	100.0	100.0	100.0	100.0
Wheat—								
Belgium	8,108,770	4,054,171	10,601,248	12,873,372	12.9	13.4	11.6	13.9
Canada	1,090,734	537,240	851,139	4,113,701	1.7	1.8	.9	4.5
France	*2,877,308*	*35,977*	*4,931,708*	*5,536,731*	*4.6*	*.1*	*5.4*	*6.0*
Germany	7,252,785	1,586,606	12,112,223	10,983,060	11.5	5.3	13.2	11.9
Italy	4,421,662	533,009	7,217,479	1,839,830	7.0	1.8	7.9	2.0
Mexico	*1,406,354*	*1,491,156*	*644,377*	*306,376*	*2.2*	*4.9*	*.7*	*.3*
Netherlands	5,150,584	3,388,444	14,832,000	19,949,519	8.2	11.2	16.2	21.6
United Kingdom	25,621,411	15,765,454	31,548,507	27,961,348	40.8	52.3	34.4	30.3
Other countries	*6,924,972*	*2,768,095*	*8,864,293*	*8,829,838*	*11.1*	*9.2*	*9.7*	*9.5*
Total	62,854,580	30,160,212	91,602,974	92,393,775	100.0	100.0	100.0	100.0
Wheat flour—	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*				
Brazil	358,419	625,399	583,418	748,612	3.0	5.7	5.1	6.3
Canada	55,606	99,760	98,665	122,752	.5	.9	.9	1.0
China	537,081	741,192	127,814	136,374	4.5	6.7	1.1	1.2
Cuba	788,471	842,168	907,786	892,705	6.7	7.7	8.0	7.6
Finland	(1)	175,575	405,832	429,354	....	1.6	3.6	3.6
Germany	411,067	130,328	170,345	176,485	3.5	1.2	1.5	1.5
Haiti	160,629	324,736	288,495	208,266	1.4	3.0	2.5	1.8
Hongkong	925,259	1,491,073	1,301,306	1,141,095	7.8	13.5	11.4	9.7
Japan	540,400	716,347	878,623	793,269	4.6	6.5	7.7	6.7
Netherlands	881,519	675,429	859,987	958,063	7.4	6.1	7.5	8.1
Philippine Islands	134,964	308,671	370,939	236,902	1.1	2.8	3.3	2.0
United Kingdom	4,219,607	2,372,797	2,428,167	2,809,800	35.6	21.6	21.3	23.8
Other countries	2,827,077	2,503,012	2,973,428	3,167,784	23.9	22.7	26.1	26.7
Total	11,840,699	11,006,487	11,394,805	11,821,461	100.0	100.0	100.0	100.0
Hops:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Canada	644,630	1,325,506	1,035,729	1,214,028	4.4	10.9	5.9	5.0
United Kingdom	13,568,675	10,463,164	15,409,093	22,219,620	91.8	85.8	87.6	91.6
Other countries	560,880	401,993	1,146,373	829,248	3.8	3.3	6.5	3.4
Total	14,774,185	12,190,663	17,591,195	24,262,896	100.0	100.0	100.0	100.0
Oil cake and oil-cake meal:								
Cottonseed—								
Belgium	33,205,110	42,981,422	38,853,330	19,685,564	3.4	3.3	3.5	2.5
Denmark	379,947,394	413,812,583	429,490,872	347,584,172	38.4	32.0	38.1	43.4
Germany	328,823,897	451,358,809	364,266,905	240,348,664	33.2	34.9	32.3	30.0
Netherlands	65,672,035	77,876,167	62,479,858	22,310,420	6.6	6.0	5.5	2.8
United Kingdom	125,012,812	247,440,239	163,960,512	131,292,496	12.6	19.1	14.5	16.4
Other countries	57,676,962	60,730,868	68,940,890	38,752,936	5.8	4.7	6.1	4.9
	989,738,130	1,293,690,138	1,128,082,867	799,974,252	100.0	100.0	100.0	100.0

TABLE 192.—*Destination of principal farm products exported from the United States, 1907–1914*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	Average, 1907–1911.	1912	1913	1914	Average, 1907–1911.	1912	1913	1914
VEGETABLE MATTER—continued.								
Oil cake and oil-cake meal—Contd.								
Linseed or flaxseed—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Belgium	282,506,100	239,849,696	330,952,259	332,697,680	43.4	40.2	39.5	50.2
France	20,702,312	40,747,747	49,700,150	20,671,619	3.2	6.9	5.9	3.1
Netherlands	275,652,388	265,879,242	391,513,427	266,792,954	42.3	44.6	46.7	40.2
United Kingdom	53,233,752	36,358,331	53,796,998	29,084,892	8.2	6.1	6.4	4.4
Other countries	19,270,976	13,279,520	12,156,820	13,621,494	2.9	2.2	1.5	2.1
Total	651,365,528	596,114,536	838,119,654	662,868,639	100.0	100.0	100.0	100.0
Oils, vegetable:								
Cottonseed—								
Argentina	3,685,461	8,893,927	14,708,379	14,989,927	1.3	2.2	4.7	7.8
Austria-Hungary	2,847,992	9,222,768	8,475,683	4,211,198	1.0	2.3	2.7	2.2
Belgium	4,636,388	9,834,185	1,970,255	3,452,229	1.6	2.5	.6	1.8
Canada	11,459,332	22,659,718	25,227,397	25,493,039	3.9	5.7	8.0	13.2
France	38,285,291	25,596,365	17,924,337	8,268,808	13.2	6.4	5.7	4.3
Germany	21,063,275	24,798,799	13,440,312	7,682,622	7.2	6.2	4.3	4.0
Italy	28,541,565	36,670,719	39,516,645	14,015,326	9.8	9.2	12.5	7.3
Mexico	28,418,278	28,961,136	23,743,576	6,219,064	9.8	7.2	7.5	3.2
Netherlands	68,638,926	97,590,174	75,349,314	26,994,772	23.6	24.4	23.9	14.0
Norway	4,819,158	8,028,128	8,986,253	6,985,490	1.7	2.0	2.9	3.6
Turkey, European	7,086,030	11,931,876	12,556,417	4,947,994	2.4	3.0	4.0	2.6
United Kingdom	30,434,591	71,420,689	31,845,444	31,071,865	10.5	17.9	10.1	16.1
Other countries	40,980,038	43,862,489	41,488,880	38,630,745	14.0	11.0	13.1	19.9
Total	290,876,625	399,470,973	315,232,892	192,963,079	100.0	100.0	100.0	100.0
Tobacco, leaf, stems, and trimmings:								
Belgium	10,942,524	10,072,410	10,235,594	11,677,604	3.3	2.7	2.4	2.6
British Africa	5,292,726	6,357,617	8,377,246	6,600,312	1.6	1.7	2.0	1.5
British Oceania	11,568,041	10,870,147	17,516,283	13,186,680	3.5	2.9	4.2	2.9
Canada	13,515,314	15,095,925	16,309,480	17,658,562	4.0	4.0	3.9	3.9
China	4,213,112	6,635,350	6,641,628	11,445,697	1.3	1.7	1.6	2.5
France	32,342,718	47,186,921	49,131,788	54,915,178	9.7	12.4	11.7	12.2
Germany	39,616,062	41,964,300	30,064,681	32,067,051	11.8	11.0	7.2	7.1
Italy	37,737,365	39,403,429	44,779,059	45,190,995	11.3	10.4	10.7	10.0
Japan	1,904,701	2,947,452	5,266,034	3,696,273	.6	.8	1.3	.8
Netherlands	21,896,221	27,277,631	26,688,355	28,233,746	6.5	7.2	6.4	6.3
Spain	13,972,444	28,674,906	23,081,022	16,822,696	4.2	7.5	5.5	3.7
United Kingdom	120,946,489	120,936,936	150,110,570	174,779,326	36.2	31.8	35.8	38.9
Other countries	20,448,214	22,422,296	30,605,166	33,455,862	6.0	5.9	7.3	7.6
Total	334,395,923	379,845,320	418,796,906	449,749,982	100.0	100.0	100.0	100.0
FOREST PRODUCTS.								
Naval stores:								
Rosin—	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*				
Argentina	93,787	122,333	131,286	102,028	4.0	4.9	4.7	4.2
Austria-Hungary	94,420	103,959	84,070	66,257	4.0	4.2	3.0	2.7
Belgium	102,263	163,345	141,013	111,735	4.3	6.6	5.0	4.6
Brazil	149,111	176,964	180,701	99,632	6.3	7.2	6.4	4.1
Canada	70,653	93,464	86,702	77,064	3.0	3.8	3.1	3.2
Germany	732,067	681,476	809,745	796,757	31.1	27.5	28.9	33.0
Italy	100,670	102,685	116,019	109,380	4.3	4.1	4.1	4.5
Netherlands	227,429	194,552	228,360	247,339	9.7	7.9	8.1	10.2
Russia, European	78,172	98,103	143,336	144,653	3.3	4.0	5.1	6.0
United Kingdom	509,843	503,516	632,515	504,400	21.6	20.3	22.5	20.9
Other countries	197,145	234,063	252,299	158,705	8.4	9.5	9.1	6.6
	2,355,560	2,474,460	2,806,046	2,417,950	100.0	100.0	100.0	100.0

TABLE 192.—*Distribution of principal farm products exported from the United States, 1907–1914*—Continued.

Article, and country to which consigned.	Quantity.				Per cent of total.			
	Year ending June 30—							
	Average 1907–1911.	1912	1913	1914	Average 1907–1911.	1912	1913	1914
FOREST PRODUCTS—continued.								
Naval stores—Contd.								
Turpentine, spirits of—	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Belgium	2,091,343	1,428,710	1,872,893	1,027,355	12.6	7.3	8.9	5.4
British Oceania	536,758	859,605	686,989	499,248	3.2	4.4	3.3	2.7
Canada	964,218	920,612	1,039,768	1,114,863	5.8	4.7	4.9	5.9
Germany	2,834,502	2,812,160	3,849,191	3,275,929	17.0	14.4	18.3	17.3
Netherlands	2,197,241	3,379,518	4,242,340	4,393,902	13.2	17.2	20.2	23.2
United Kingdom	6,363,766	7,865,713	7,432,271	7,109,851	38.2	40.1	35.3	37.6
Other countries	1,671,127	2,332,923	1,916,145	1,479,556	10.0	11.9	9.1	7.9
Total	16,658,955	19,599,241	21,039,597	18,900,704	100.0	100.0	100.0	100.0
Wood:								
Lumber—								
Boards, deals, planks, joists, and scantling—	*M. feet.*	*M. feet.*	*M. feet.*	*M. feet.*				
Argentina	237,814	325,525	248,363	208,177	14.2	13.9	9.6	8.6
Belgium	57,254	64,970	78,662	62,772	3.4	2.8	3.1	2.6
Brazil	35,784	59,866	69,823	38,125	2.1	2.6	2.7	1.6
British Oceania	126,720	218,431	260,473	293,009	7.6	9.3	10.1	12.1
Canada	207 698	553 090	545,257	434,399	12.4	23.6	21.2	18.0
Central American States and British Honduras	52,151	52,483	56,509	81,251	3.1	2.2	2.2	3.4
China	65,015	33,668	88,749	107,115	3.9	1.4	3.4	4.4
Cuba	115,945	122,846	137,982	122,938	6.9	5.2	5.4	5.1
France	26,847	24,604	30,202	39,563	1.6	1.1	1.2	1.6
Germany	68,466	74,068	83,752	69,852	4.1	3.2	3.3	2.9
Italy	36,235	35,397	44,319	53,623	2.2	1.5	1.7	2.2
Mexico	103,411	106,574	121,657	69,111	6.2	4.6	4.7	2.9
Netherlands	79,049	102,012	125,201	120,661	4.7	4.4	4.9	5.0
Philippine Islands	16,139	24,222	15,747	22,485	1.0	1.0	.6	.9
United Kingdom	201,608	226,537	333,390	332,457	12.0	9.7	12.9	13.8
Other countries	247,108	316,616	336,147	361,901	14.6	13.5	13.0	14.9
Total	1,677,189	2,340,909	2,576,233	2,417,439	100.0	100.0	100.0	100.0
Timber, hewn and sawed—								
Canada	422,036	53,462	39,705	37,840	10.9	12.2	7.8	8.6
France	212,883	20,132	39,950	32,047	5.5	4.6	7.8	7.3
Germany	312,255	25,211	32,023	17,506	8.0	5.8	6.3	4.0
Italy	139,156	51,260	44,726	65,314	3.6	11.7	8.7	14.8
Netherlands	666,403	64,827	60,692	57,776	17.1	14.7	11.9	13.1
United Kingdom	1,372,855	156,317	213,016	186,906	35.3	35.7	41.6	42.4
Other countries	760,434	67,312	81,525	43,771	19.6	15.3	15.9	9.8
Total	3,886,022	438,021	511,637	441,166	100.0	100.0	100.0	100.0

TABLE 193.—*Origin of principal farm products imported into the United States, 1907–1914.*

Article, and country from which consigned.	Quantity.				Per cent of total.			
	Year ending June 30.							
	Average, 1907–1911.	1912	1913	1914	Average, 1907–1911.	1912	1913	1914
ANIMAL MATTER.								
Cattle:	*Number.*	*Number.*	*Number.*	*Number.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Mexico	117,424	315,227	391,477	625,253	91.3	99.0	92.8	72.0
Other countries	11,137	3,145	30,172	243,115	8.7	1.0	7.2	28.0
Total	128,561	318,372	421,649	868,368	100.0	100.0	100.0	100.0
Horses:								
Canada	2,934	1,828	2,063	4,435	36.8	27.7	20.6	13.4
France	1,761	1,692	1,925	1,171	22.1	25.6	19.2	3.5
Other countries	3,278	3,087	6,020	27,413	41.1	46.7	60.2	83.1
Total	7,973	6,607	10,008	33,019	100.0	100.0	100.0	100.0
Dairy products:								
Cheese, including substitutes—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
France	3,138,174	3,882,891	3,982,513	5,418,904	8.3	8.3	8.1	8.5
Italy	15,636,641	20,625,202	21,326,445	26,453,826	41.5	44.3	43.2	41.5
Switzerland	*12,995,639*	*15,147,393*	*17,371,618*	*22,490,006*	34.5	32.5	35.2	35.3
Other countries	5,892,358	6,886,521	6,707,370	9,421,577	15.7	14.9	13.5	14.7
Total	37,662,812	46,542,007	49,387,944	63,784,313	100.0	100.0	100.0	100.0
Fibers, animal:								
Silk, raw—								
China	3,931,790	4,776,606	5,510,607	5,926,745	20.0	22.1	21.2	20.7
Italy	3,566,997	2,058,456	2,811,606	1,997,428	18.2	9.5	10.8	7.0
Japan	11,502,167	14,493,131	17,425,353	20,196,212	58.6	67.1	66.9	70.6
Other countries	*643,711*	*281,427*	*301,906*	*474,287*	3.2	1.3	1.1	1.7
Total	19,644,665	21,609,520	26,049,472	28,594,672	100.0	100.0	100.0	100.0
Wool, class 1—								
Argentina	21,276,032	21,450,715	22,603,402	30,959,660	25.1	30.1	33.6	24.8
Australia, Commonwealth of	24,106,334	12,971,908	5,619,342	23,757,714	28.5	18.2	8.4	19.0
Belgium	1,790,991	62,478	266,930	4,581,419	2.1	.1	.4	3.7
New Zealand	3,751,077	2,923,527	6,306,874	4,710,748	4.4	4.1	9.4	3.8
United Kingdom	*28,938,730*	*30,928,128*	*29,368,707*	*45,223,714*	34.2	43.4	43.7	36.2
Uruguay	3,788,822	2,666,702	2,657,620	7,972,150	4.5	3.7	4.0	6.4
Other countries	959,861	199,871	415,840	7,883,347	1.2	.4	.5	6.1
Total	84,611,847	71,203,329	67,238,715	125,088,761	100.0	100.0	100.0	100.0
Wool, class 2—								
Canada	1,378,171	631,216	243,908	4,542,139	7.7	4.1	1.4	24.1
United Kingdom	13,824,910	11,772,512	13,505,151	12,301,661	76.8	75.7	80.0	65.3
Other countries	2,802,295	3,153,936	3,137,387	1,995,898	15.5	20.2	18.6	10.6
Total	18,005,376	15,557,664	16,886,446	18,839,698	100.0	100.0	100.0	100.0
Wool, class 3—								
Argentina	3,691,415	4,429,123	2,337,196	5,452,526	3.8	4.2	2.1	5.3
British East Indies	3,745,144	4,440,606	3,962,811	2,788,130	3.9	4.2	3.6	2.7
China	30,634,891	32,060,405	35,926,815	29,884,054	31.6	30.1	32.3	29.3
Russia (Asiatic and European)	17,289,187	20,757,933	25,645,077	22,637,514	17.8	19.5	23.1	22.2
Turkey (Asiatic)	7,739,662	7,780,616	7,394,257	5,350,091	8.0	7.3	6.7	5.2
United Kingdom	22,248,649	23,122,561	20,900,746	22,105,267	22.9	21.7	18.8	21.7
Other countries	11,596,478	14,048,476	15,001,192	13,795,731	12.0	13.0	13.4	13.6
Total	96,945,426	106,639,720	111,168,094	102,003,313	100.0	100.0	100.0	100.0

TABLE 193.—*Origin of principal farm products imported into the United States, 1907–1914*—Continued.

Article, and country from which consigned.	Quantity.				Per cent of total.			
	Year ending June 30.							
	Average, 1907–1911.	*1912*	*1913*	*1914*	Average, 1907–1911.	*1912*	*1913*	*1914*
ANIMAL MATTER—continued.								
Packing-house products:								
Hides and skins, other than furs—								
Calf skins—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Belgium		4,222,034	4,724,643	5,157,640		4.0	5.0	6.3
Canada		6,192,704	5,930,010	5,734,207		5.9	6.3	7.0
France		5,134,402	4,991,299	5,800,673		4.9	5.3	7.0
Germany		21,886,652	16,916,203	16,560,316		20.8	17.9	20.1
Netherlands	(1)	8,582,182	8,142,510	12,006,926	(1)	8.2	8.6	14.6
Russia (European)		31,035,801	30,247,647	19,747,462		29.5	32.0	24.0
Other countries		28,198,714	23,606,823	17,396,366		26.7	24.9	21.0
Total	(1)	105,252,489	94,559,135	82,403,590	(1)	100.0	100.0	100.0
Cattle hides—								
Argentina	45,447,872	83,662,262	67,041,938	79,787,332	25.4	33.3	25.0	28.5
Belgium	6,668,560	9,073,305	7,106,337	7,313,906	3.7	3.6	2.7	2.6
Brazil	1,330,961	714,256	1,743,956	3,259,873	.7	.3	.7	1.2
Canada	27,374,445	29,769,745	41,608,176	46,583,543	15.3	11.9	15.5	16.6
Colombia	4,684,133	6,303,727	5,461,505	5,098,244	2.6	2.5	2.0	1.8
Cuba	4,508,675	4,366,121	2,840,141	5,528,502	2.5	1.7	1.1	2.0
East Indies	8,116,461	3,175,040	6,929,176	4,474,768	4.5	1.3	2.6	1.6
France	13,059,418	15,573,978	20,102,370	19,036,552	7.3	6.2	7.5	6.8
Germany	5,411,370	7,246,577	9,787,812	4,989,795	3.0	2.9	3.7	1.8
Italy	2,784,857	4,853,634	2,411,973	1,967,552	1.6	1.9	.9	.7
Mexico	19,935,692	28,103,124	29,500,427	33,194,289	11.2	11.2	11.0	11.9
Netherlands	3,576,193	6,580,433	7,270,864	4,099,899	2.0	2.6	2.7	1.5
Russia (European)	1,407,135	9,044,482	22,906,231	9,043,103	.8	3.6	8.5	3.2
United Kingdom	6,940,237	9,262,242	8,588,600	11,204,957	3.9	3.7	3.2	4.0
Uruguay	11,619,939	10,933,642	7,244,806	13,403,443	6.5	4.4	2.7	4.8
Venezuela	4,657,262	5,555,809	4,470,501	5,149,398	2.6	2.2	1.7	1.8
Other countries	11,158,327	16,794,136	23,028,077	25,823,332	6.4	6.7	8.5	9.2
Total	178,681,537	251,012,513	268,042,390	279,963,488	100.0	100.0	100.0	100.0
Goatskins—								
Aden	4,016,159	3,338,866	3,129,594	3,595,909	4.3	3.5	3.8	4.2
Africa	4,692,173	2,834,130	2,625,746	2,817,948	5.0	3.0	2.7	3.3
Argentina	3,396,239	5,323,163	4,276,365	3,470,013	3.6	5.6	4.4	4.1
Brazil	3,607,515	3,600,012	3,357,781	4,191,124	3.8	3.8	3.5	4.9
China	10,395,656	7,107,859	9,827,646	7,304,761	11.0	7.5	10.2	8.6
East Indies	38,285,240	41,069,568	41,594,938	35,881,857	40.6	43.1	43.2	42.3
France	4,053,395	2,489,532	2,406,871	2,171,224	4.3	2.6	2.5	2.6
Mexico	7,046,718	5,241,903	4,816,304	4,010,150	7.5	5.5	5.0	4.7
Russia (European)	4,819,488	7,299,991	7,169,542	5,131,075	5.1	7.7	7.5	6.1
United Kingdom	3,990,869	5,954,074	5,436,922	5,281,468	4.2	6.2	5.6	6.2
Other countries	10,026,388	11,081,602	11,598,096	10,953,899	10.6	11.5	12.1	13.0
Total	94,329,840	95,340,703	96,260,305	84,759,428	100.0	100.0	100.0	100.0
Sheepskins—								
Argentina		5,566,064	6,848,065	3,874,944		9.2	9.5	5.5
Brazil		1,134,635	993,321	1,882,333		1.9	1.4	2.3
British Oceania		5,655,170	8,179,576	9,848,498		9.4	11.4	14.1
Canada		1,478,584	1,860,948	3,678,117		2.4	2.6	5.2
France	(1)	2,158,832	2,999,829	2,221,760	(1)	3.6	4.2	3.2
Russia (European)		7,148,585	8,494,277	9,156,287		11.8	11.8	13.1
United Kingdom		25,992,351	28,885,579	26,384,802		43.0	40.2	37.7
Other countries		11,266,108	13,533,024	13,327,985		18.7	18.9	18.9
Total	(1)	60,400,309	71,784,719	70,078,828	(1)	100.0	100.0	100.0

TABLE 193.—*Origin of principal farm products imported into the United States, 1907–1914*—Continued.

Article, and country from which consigned.	Quantity.				Per cent of total.			
	Year ending June 30.							
	Average, 1907–1911.	1912	1913	1914	Average, 1907–1911.	1912	1913	1914
VEGETABLE MATTER.								
Cocoa, crude:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Brazil	15,859,013	17,173,568	14,354,460	25,870,186	14.4	11.8	10.3	14.7
British West Indies	31,046,466	36,447,160	29,588,055	44,062,426	28.1	25.0	21.1	25.0
Ecuador	12,734,268	22,976,780	15,229,159	26,319,735	11.5	15.7	10.9	14.9
Portugal	14,623,642	18,954,405	23,040,617	17,738,638	13.3	13.0	16.5	10.1
Santo Domingo	*15,977,093*	*27,786,868*	*27,241,763*	*26,782,966*	*14.5*	*19.0*	*19.5*	*15.2*
United Kingdom	3,701,708	8,791,716	11,660,464	12,903,640	3.4	6.0	8.3	7.3
Other countries	16,390,254	13,838,448	18,924,654	22,590,055	14.8	9.5	13.4	12.8
Total	110,332,444	145,968,945	140,039,172	176,267,646	100.0	100.0	100.0	100.0
Coffee:								
Brazil	729,057,927	632,527,267	639,262,011	743,113,500	78.0	71.5	74.1	74.2
Central American States and British Honduras	45,546,944	39,264,532	32,172,524	40,202,480	4.9	4.4	3.7	4.0
Colombia	51,939,867	62,912,252	89,084,514	91,830,513	5.6	7.1	10.4	9.2
East Indies	*10,000,852*	*12,907,807*	*7,559,765*	*7,413,605*	*1.1*	*1.5*	*.9*	*.7*
Mexico	25,036,322	34,156,025	26,121,439	49,385,504	2.7	3.9	3.0	4.9
Netherlands	1,582,121	1,941,746	1,956,676	5,811,934	.2	.2	.2	.6
Venezuela	49,735,569	47,109,521	49,671,060	49,953,478	5.3	5.3	5.8	5.0
West Indies and Bermuda	5,508,683	8,061,867	4,110,032	4,532,479	.6	.9	.5	.5
Other countries	16,125,037	46,320,230	12,592,736	9,284,824	1.6	5.2	1.4	.9
Total	934,533,322	885,201,247	863,130,757	1,001,528,317	100.0	100.0	100.0	100.0
Fibers, vegetable:								
Cotton—								
Egypt	*70,046,332*	*85,103,780*	*94,333,483*	*63,668,055*	*75.8*	*77.5*	*77.4*	*51.6*
Peru	4,727,682	4,848,201	4,871,835	6,455,946	5.1	4.4	4.0	5.2
United Kingdom	8,201,692	10,356,921	8,354,253	2,557,041	8.9	9.4	6.9	2.1
Other countries	9,462,027	9,471,169	14,292,445	50,665,857	10.2	8.7	11.7	41.1
Total	92,437,733	109,780,071	121,852,016	123,346,899	100.0	100.0	100.0	100.0
Flax—	*Long tons.*	*Long tons.*	*Long tons.*	*Long tons.*				
Belgium	2,454	2,434	1,919	1,266	25.2	22.3	15.4	12.8
Russia, European	2,682	2,535	4,450	2,735	27.6	23.3	35.8	27.7
United Kingdom	3,083	4,251	4,464	5,076	31.7	39.0	35.9	51.4
Other countries	1,502	1,680	1,588	808	15.5	15.4	12.9	8.1
Total	9,721	10,900	12,421	9,885	100.0	100.0	100.0	100.0
Jute and jute butts—								
British East Indies	95,993	99,100	120,511	100,755	95.6	98.1	96.1	95.0
Other countries	4,427	1,901	4,878	5,278	4.4	1.9	3.9	5.0
Total	100,420	101,001	125,389	106,033	100.0	100.0	100.0	100.0
Manila fiber—								
Philippine Islands	66,930	66,923	69,629	49,285	99.5	97.6	94.3	99.2
Other countries	359	1,613	4,194	403	.5	2.4	5.7	.8
Total	67,289	68,536	73,823	49,688	100.0	100.0	100.0	100.0
Sisal grass—								
Mexico	98,231	103,683	136,559	195,086	95.9	90.6	88.8	90.5
Other countries	4,209	10,784	17,310	20,461	4.1	9.4	11.2	9.5
Total	102,440	114,467	153,869	215,547	100.0	100.0	100.0	100.0
Fruits:								
Bananas—	*Bunches.*	*Bunches.*	*Bunches.*	*Bunches.*				
British West Indies	11,519,859	15,474,513	11,164,894	15,677,191	36.7	34.8	26.4	32.2
Central American States and British Honduras	15,651,494	23,631,604	25,108,590	25,360,760	49.9	53.1	59.3	52.1
Cuba	1,955,774	2,478,581	2,213,783	2,354,395	6.2	5.6	5.2	4.8
South America	1,699,959	1,804,536	2,869,247	2,271,866	5.4	4.1	6.8	4.7
Other countries	539,485	1,131,305	1,000,645	3,019,380	1.8	2.4	2.3	6.2
Total	31,366,571	44,520,539	42,357,109	48,683,592	100.0	100.0	100.0	100.0

TABLE 193.—*Origin of principal farm products imported into the United States, 1907–1914*—Continued.

Article, and country from which consigned.	Quantity.				Per cent of total.			
	Year ending June 30.							
	Average, 1907–1911.	1912	1913	1914	Average, 1907–1911.	1912	1913	1914
VEGETABLE MATTER—contd.								
Nuts:								
Walnuts—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Austria-Hungary	749,415	771,003	4,409	514,455	2.4	2.1	0.0	1.4
France	22,486,462	24,145,579	20,379,294	19,020,143	72.6	64.9	76.4	51.1
Italy	4,689,720	5,143,873	3,315,483	6,275,717	15.1	13.8	12.4	16.9
Turkey (Asiatic)	927,009	718,915	424,418	1,712,209	3.0	1.9	1.6	4.6
Other countries	2,128,055	6,434,304	2,538,837	9,673,204	6.9	17.3	9.6	26.0
Total	30,980,661	37,213,674	26,662,441	37,195,728	100.0	100.0	100.0	100.0
Oil, vegetable:								
Olive, salad—	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*				
France	800,454	809,629	932,536	949,858	20.5	16.7	17.9	15.3
Italy	2,546,390	3,245,863	3,584,945	4,319,567	65.3	67.1	68.7	69.5
Other countries	550,380	781,023	703,520	948,135	14.2	16.2	13.4	15.2
Total	3,897,224	4,836,515	5,221,001	6,217,560	100.0	100.0	100.0	100.0
Soya bean oil—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Japan	(1)	13,357,373	7,979,144	6,427,307	(1)	47.7	64.7	39.3
United Kingdom		9,874,210	2,523,321	1,453,932		35.2	20.4	8.9
Other countries		4,789,699	1,837,720	8,481,213		17.1	14.9	51.8
Total	(1)	28,021,282	12,340,185	16,362,452	(1)	100.0	100.0	100.0
Opium:								
Turkey (Asiatic and European)	296,294	274,712	420,406	378,815	60.5	68.7	82.7	83.2
United Kingdom	153,564	82,782	61,782	39,372	31.8	20.7	12.2	8.6
Other countries	37,655	42,343	26,245	37,013	7.7	10.6	5.1	8.2
Total	489,513	399,837	508,433	455,200	100.0	100.0	100.0	100.0
Seeds:								
Flaxseed or linseed—	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*				
Argentina	1,661,252	1,210,628	429,254		51.1	17.7	8.1	
Belgium	75,745	357,480	157	3	2.3	5.2	.0	.0
British India	513,485	1,525,310	128,981	50	15.8	22.3	2.4	.0
Canada	831,538	3,510,883	4,732,316	8,647,168	25.6	51.3	89.4	99.9
United Kingdom	166,176	183,119	2,453	6,010	5.1	2.7	0.0	.1
Other countries	437	54,386	1,135	4	.1	.8	.1	.0
Total	3,248,633	6,841,806	5,294,296	8,653,235	100.0	100.0	100.0	100.0
Grass seed—								
Clover—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Canada	3,729,956	3,551,792	2,887,143	5,741,516	19.5	9.2	13.6	19.1
France	4,474,698	8,882,820	6,857,996	15,402,710	23.4	23.0	32.3	51.2
Germany	6,185,059	12,951,378	5,655,558	4,200,141	32.3	33.6	26.6	14.0
Italy	2,180,874	5,823,223	2,816,795	44,000	11.4	15.1	13.3	.1
Other countries	2,573,937	7,341,924	3,007,965	4,719,282	13.4	19.1	14.2	15.6
Total	19,144,524	38,551,137	21,224,557	30,107,649	100.0	100.0	100.0	100.0
Sugar, raw, cane:								
Cuba	3,052,989,489	3,186,630,466	4,311,744,043	4,926,606,243	79.5	77.9	94.7	97.3
Dutch East Indies	499,629,635	340,396,410	12,759,756		13.0	8.3	.3	
Philippine Islands	110,688,396	435,570,122	208,160,972	116,749,211	2.9	10.6	4.5	2.3
Santo Domingo	52,401,679	17,681,938	2,670,630	4,316,282	1.4	.4	.1	.1
South America	72,104,562	75,977,074	20,047,828	9,386,732	1.9	1.9	.4	.2
Other countries	54,785,691	35,873,706	3,666,643	4,506,153	1.3	.9	.0	.1
Total	3,842,599,452	4,092,129,718	4,554,049,872	5,061,564,621	100.0	100.0	100.0	100.0
Tea:								
Canada	2,913,222	2,558,583	3,024,508	3,112,868	3.0	2.5	3.2	3.4
China	28,787,073	17,605,670	23,728,418	20,139,349	29.8	17.4	25.0	22.1
East Indies	7,865,313	13,760,787	10,411,286	10,551,735	8.1	13.6	11.0	11.6
Japan	45,490,455	53,747,396	44,381,278	41,913,273	47.0	53.0	46.8	46.0
United Kingdom	10,283,991	12,857,949	12,238,114	14,077,501	10.6	12.7	12.9	15.4
Other countries	1,402,923	846,441	1,029,194	1,336,481	1.5	.8	1.1	1.5
Total	96,742,077	101,406,816	94,812,800	91,130,815	100.0	100.0	100.0	100.0

TABLE 193.—*Origin of principal farm products imported into the United States, 1907–1914*—Continued.

Article, and country from which consigned.	Quantity.				Per cent of total.			
	Year ending June 30.							
	Average, 1907–1911.	1912	1913	1914	Average, 1907–1911.	1912	1913	1914
VEGETABLE MATTER—contd.								
Tobacco, leaf:								
Wrapper—	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Netherlands	6,088,884	6,290,499	6,193,042	5,846,504	95.8	97.2	96.8	96.0
Other countries	265,704	179,513	205,740	246,283	4.2	2.8	3.2	4.0
Total	6,354,588	6,470,012	6,398,782	6,092,787	100.0	100.0	100.0	100.0
Other leaf—								
Cuba	22,701,893	22,744,032	27,553,759	26,617,545	65.1	48.9	45.1	49.3
Germany	2,452,793	518,078	1,659,390	456,445	7.0	1.1	2.7	.8
Turkey (Asiatic)	3,897,065	11,238,546	18,955,295	15,616,543	11.2	24.1	31.0	28.9
Turkey (European)	4,388,454	10,371,907	10,816,048	8,502,742	12.6	22.3	17.7	15.7
Other countries	1,428,958	1,669,204	2,071,471	2,821,450	4.1	3.6	3.5	5.3
Total	34,869,163	46,536,767	61,055,963	54,014,725	100.0	100.0	100.0	100.0
FOREST PRODUCTS.								
India rubber, crude:								
Belgium	3,799,181	6,101,346	5,917,440	10,978,753	4.7	5.5	5.2	8.3
Brazil	37,491,456	46,762,744	43,518,861	40,641,305	46.8	42.4	38.4	30.8
Central American States and British Honduras	1,163,094	1,390,555	989,772	565,487	1.5	1.3	.9	.4
East Indies	2,329,197	6,338,130	12,255,500	16,597,105	2.9	5.8	10.8	12.6
France	2,490,616	4,139,109	2,968,232	2,629,287	3.1	3.8	2.6	2.0
Germany	4,944,586	8,820,516	7,790,742	7,079,260	6.2	8.0	6.9	5.4
Mexico	11,249,019	2,226,541	2,033,791	640,448	14.0	2.0	1.8	.5
Portugal	2,167,201	1,449,790	873,249	556,560	2.7	1.3	.8	.4
United Kingdom	12,208,216	29,728,994	34,164,908	48,279,674	15.2	27.0	30.1	36.6
Other countries	2,287,001	3,252,448	2,871,864	4,027,863	2.9	2.9	2.5	3.0
Total	80,129,567	110,210,173	113,384,359	131,995,742	100.0	100.0	100.0	100.0
Wood:								
Cabinet woods, mahogany—	*M feet.*	*M feet.*	*M feet.*	*M feet.*				
British Africa	3,786	3,254	7,655	12,888	8.5	7.5	11.5	18.3
Central American States and British Honduras	11,046	12,732	13,526	23,356	24.9	29.5	20.4	33.1
Mexico	12,157	10,596	10,866	10,381	27.4	24.5	16.4	14.7
United Kingdom	11,409	10,428	20,866	18,289	25.7	24.1	31.5	26.0
Other countries	5,971	6,184	13,405	5,556	13.5	14.4	20.2	7.9
Total	44,369	43,194	66,318	70,470	100.0	100.0	100.0	100.0
Boards, planks, deals, and other sawed lumber—								
Canada	887,738	870,323	1,021,810	892,833	98.7	96.2	93.7	96.1
Other countries	11,921	34,829	68,818	36,040	1.3	3.8	6.3	3.9
Total	899,659	905,152	1,090,628	928,873	100.0	100.0	100.0	100.0
Wood pulp:	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*				
Canada	395,648,286	468,870,801	463,877,981	524,251,441	55.4	43.8	41.2	46.0
Germany	106,095,641	147,030,609	151,481,033	149,171,214	14.8	13.7	13.4	13.1
Norway	91,024,418	166,097,531	189,951,459	181,255,024	12.7	15.5	16.9	15.9
Sweden	86,433,711	238,613,758	283,916,347	265,457,874	12.1	22.3	25.2	23.3
Other countries	35,373,805	49,005,759	37,298,387	18,591,642	5.0	4.7	3.3	1.7
Total	714,575,861	1,069,618,458	1,126,525,207	1,138,727,195	100.0	100.0	100.0	100.0

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